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ABSTRACT

This manual is designed to provide practical assistance to teachers in Contemporary Issues in Science programs. The manual, divided into five sections, includes activities designed to help students develop skills in reading, writing, speaking, listening, research, and critical thinking. Provided in section 1 (source selection) is a teaching unit covering the various qualities of research. It includes methods in evaluating sources and a lesson plan coordinated with a sample student worksheet. Sample articles from a variety of sources are given. Additional articles may be selected for student analysis/discussion by using the criteria for source evaluation provided. Section 2 begins with a diagnostic test. Based on test results, lessons can be selected to assist students in becoming more efficient in their library research. Various practical activities are included. Section 3 provides a variety of suggestions, activities, and lessons to help students improve their writing skills. Section 4 provides case studies (with questions for discussion) involving difficult, real situations which can and have evolved through our advancing technological society. Section 5 offers guidelines for helping students understand the complex interrelationship between science, society, and impact of the media. Objectives, instructional strategies, and suggested questions are provided for each topic in this section. (JN)

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CONTEMPORARY ISSUES IN SCIENCE

Course Manual

Contemporary Issues in Science
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FOREWORD

This publication is part of a series designed to provide practical assistance to teachers in Contemporary Issues in Science programs as well as in other courses which are involved with the difficult problems faced by man in today's complex society. Thus, it is hoped that this *Manual* will be of help also to teachers of language arts, social studies, psychology, and the humanities.

The *Contemporary Issues in Science-Course Manual* provides a wealth of classroom activities for implementing established aims. Specific classroom activities are presented here to help students develop skills in reading, writing, speaking, listening, research, and critical thinking.

This *Manual* is divided into five sections. The emphasis is on the "how-to-do" and "what-to-do." Every effort has been made to meet the teacher's need. The specific procedures presented here may be used in any combination by the teacher. Used by itself the *Course Manual* should provide ample material for a full term's work. Coordinated with subject matter from a particular curriculum this *Manual* should provide activities for a full year's work.

SECTION I: SOURCE SELECTION

This section provides the teacher with a teaching unit which covers the various qualities of research. It includes methods in the evaluation of sources and a lesson plan coordinated with a sample student worksheet. Finally, sample articles from a variety of different sources are given. Using the criteria for source evaluation found in this section, the teacher can select additional articles to give to pupils for critical analysis and discussion.

SECTION II: RESEARCH TOOLS

This section begins with a diagnostic test which can be administered to students. Based on the results of this test, the teacher can select those lessons presented in this section which will assist the students in becoming more efficient in their library research. Many practical activities are included. Additional student activities and lessons are contained in the companion publication: *Contemporary Issues in Science-Writing Manual.*

SECTION III: WRITING

This section provides suggestions, activities, and lessons to help students improve their writing skills. It can be used as a teacher supplement to the *Writing Manual* or by itself. The parts of this section deal with how to plan a research paper, how to take meaningful notes, and how to limit a topic. Specific examples in reading comprehension, concise writing, and logical arrangements of facts are included.

SECTION IV: CASE STUDIES

This section provides several case studies with questions for discussion. The case studies involve difficult, real situations which can and have evolved through our advancing technological society. The questions focus students' attention on the ethical ramifications of each issue. Specific suggestions are given in how to organize class discussions of these cases. The issues include the problems inherent in anti-aging drugs, emergency room ethics, family vs. patient autonomy in the "right to die," euthanasia, individual rights to privacy, health risks and equal opportunity, and others.

SECTION V: SCIENCE, SOCIETY, MEDIA

This section offers guidelines for helping students understand the complex interelationship between science and society and the impact of the media. The topics include: What forces determine the areas of research a scientist pursues? What are the economic, political and moral implications of scientific and technological development? What are the responsibilities that scientists have to society in regard to the consequences of their research? How does government policy legislatively and administratively affect scientific development? How do the media affect society's view of science? In what ways does society determine public policy with respect to scientific and technological research? Each topic contains three parts: a list of objectives, methods of development, and a summary with suggested pivotal questions.

The *Contemporary Issues in Science-Course Manual* and its companion publications, the *Writing Manual* which guides students through the stages of writing the research paper, and the *Implementation Manual* which describes the various ways a Contemporary Issues in Science program can be utilized, are designed to be of practical value to teachers recognizing the many social problems related to the science which today's students face and will continue to face in a variety of every-changing ways in the years to come. It is hoped these manuals will help teachers better prepare their classes in the development of the essential skills in reading, writing, speaking, listening, research, and critical thinking which transcend and at the same time unite the individual curriculum sequences.

SECTION I: SOURCE SELECTION

PART I
SOURCE SELECTION

INTRODUCTION

Your students are going to prepare a research paper although most do not understand what research is or the steps necessary in its production.

Some think of it as an erudite activity which produces the marvels of science, industry and business. Such cleverness, the student feels, is much beyond his capability. Others consider research a dull round of observations, literal notes with poor style, superficial statistics and a few doubtful, trivial conclusions. Between these two extremes there is a modest but valuable kind of research that any student can learn to do.

This first section provides a complete teaching unit that covers the values, validity and characteristics of research. Next, the process of proper source selection and evaluation is developed in depth. Finally, a demonstration lesson plan coordinated with a student worksheet and sample source selections furnishes the teacher with a suggested way to teach the skills required. Using the criteria for source evaluation found in this section, the teacher can present additional articles to pupils for critical analysis and discussion.

TOPIC I: VALUES AND VALIDITY OF RESEARCH

A. Values of Research

Some important *values* may be gained by mastering the method of research:

1. Almost all jobs employ some research to learn basic methodology.
2. Science and most professions have made research a basic tool to upgrade production.

B. Validity of Research

The *validity* of research as a way of study is based upon certain characteristics of the method.

1. *Research is thorough.*
   The researcher seeks to find out all aspects and background of his subject. He obtains all available knowledge about it, using the resources of a good library which supplies indices, journals, abstracts, books, magazines and other information. When the researcher has completed his task, he has compiled a huge amount of information and can make relatively sound judgments.
2. *Research is responsible.*
   Using bibliography and footnotes every statement of research is checked. Exaggerations, prejudices and wishful thinking are easily seen and corrected.
3. *Research is a system of world-wide collaboration.*
   The dispersion of periodicals world-wide enables researchers in every country to benefit from someone else's work by solving a problem in his or her own research. This collaborative feature of research allows for the massive spread of modern learning and subsequent advancement.

   Even elementary research which a high school student can do in a few months can be difficult, requiring all one's patience, persistence, industry, wisdom and ingenuity. The motivated researcher never finds this dull as he enjoys the creativity and concrete accomplishment that good research always provides.

   Successful research starts with proper orientation. It is really a way of thinking and/or a manner of regarding accumulated fact so that a collection of data becomes clear to the researcher in terms of what the data means and what the facts say. Students need to see clearly this process which, for them, is an unfamiliar process. Research is simply the manner in which people solve difficult problems.

TOPIC II: CHARACTERISTICS OF RESEARCH

Research has seven characteristics which appear in sequence. For the student to be a researcher, he must become familiar with these steps which when taken together comprise the approach to the discovery of truth.

1. *Research begins with a question.*
   As the student looks around his environment, he notices many situations that cause him to ask, "Why?" "What causes this to be true?" A real-life situation might be two siblings go to the same school, have the same teacher and receive the same support from home. Yet, one learns and develops quickly while the other has little or no success at reading and writing. Why? These questions give us a starting point for research.

   Research begins with a question and an inquisitive mind in the presence of a bewildering fact.

2. *Research requires a plan.*
   Research is not an aimless, undirected activity in which a student may *look up something* hoping to *come across* the solution to his problem. It will require a definite plan, direction and design.

   The process should proceed from the question to learned facts which will give him the answer, utilizing clear statements, hypotheses, a design for gathering and interpreting data, a test of the hypothesis and a conclusion based on facts.

3. *Research demands a clear statement of the problem.*
   The unanswered questions that the researcher finds he wants to solve must crystallize at the very beginning of the research in precise statements setting forth exactly what he wants to solve. The student must clearly see what it is he is trying to research.

4. *Research deals with the main problem through lesser problems.*
   For practicality and an avoidance of a cumbersome, unwieldly and poorly defined research paper, the student needs to learn to develop sub-problems which, when solved, will result in a total solution to the main research problem.

   To illustrate, the real life situation of why two siblings are not achieving at the same rate is perplexing as both started enthusiastically and were tested to have about the same intelligence. However, by grade 10, one had complete success while the other was faltering badly. Looked at in totality, the central issues begin to blur. We can bring matters back into focus by looking at some sub-problems such as:

a. What were the expectations of the parents?

b. What major events might have caused a change in one of the students?

c. What is the present educational focus of each sibling?

The solving of these sub-problems will provide an answer to the main problems.

5. *Research seeks direction through appropriate hypothesis.*
After the problem and sub-problem are clearly stated, each sub-problem is viewed through a logical hypothesis. A hypothesis is a reasonable guess or an educated deduction which may give direction to the problem and help in solving it.

We use hypotheses as an everyday part of our life although we do not realize we are using them. When something out of the ordinary occurs, we immediately try to account for the occurrence by a series of guesses and logical deductions. This is a process of hypothesizing. For example, why are these siblings not achieving at the same rate? You now begin a series of reasonable guesses as to the cause of the problems. You hypothesize several possibilities:

a. One has a physical impairment.

b. Possibly dyslexia exists and learning is impossible.

c. Mental problems may exist, stopping learning.

d. Experiments with drugs have caused a loss of direction.

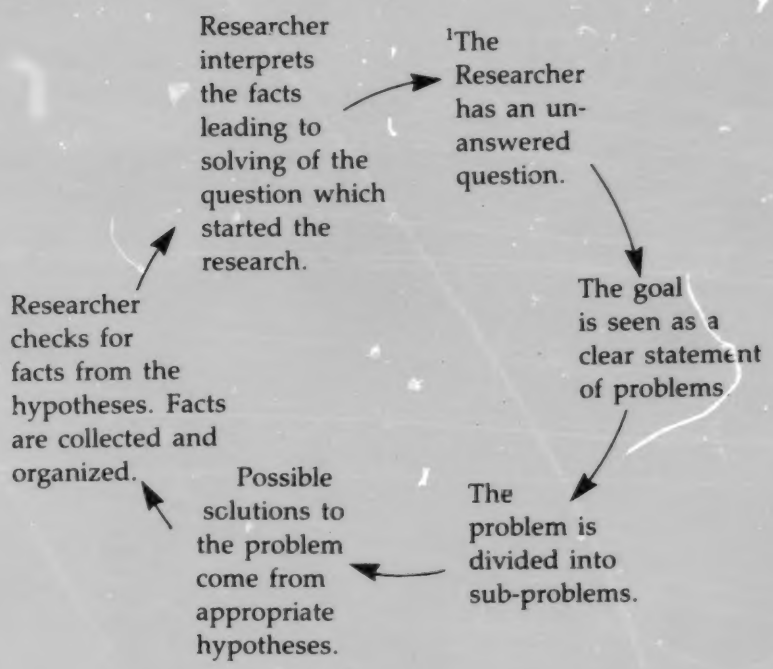
Each hypothesis provides direction in learning the facts as to why one sibling is not achieving. The next step is to search for the facts. You check hypothesis letter "(a)" and find no impairment. That rules out hypothesis "(a)". You can continue in this manner until you test and find support for one or more of your hypotheses.

In the same way when you are faced with a problem for research, you make educated guesses to help in discovering the solution and in giving you direction in looking for the facts.

6. *Research deals with facts and their meaning.*
The next step is to collect whatever facts seem to be pertinent to the problem and organize them into groups capable of being understood. Facts, events, observations and happenings in themselves are meaningless, but when they are put together properly they offer great meaning. Often, the significance of data depends upon the way the facts are seen. Often different researchers read entirely different meanings from the same set of data.

7. *Research is circular.*
As the student proceeds along all his research steps and solves his problems, he often creates more problems, causing research to continue. This continuation starts with a new question, a plan, clear statements, sub-problems, appropriate hypotheses and facts that yield a conclusion.

THE RESEARCH PROCESS


[1]The Researcher has an un-answered question.
The goal is seen as a clear statement of problems.
The problem is divided into sub-problems.
Possible sclutions to the problem come from appropriate hypotheses.
Researcher checks for facts from the hypotheses. Facts are collected and organized.
Researcher interprets the facts leading to solving of the question which started the research.

TOPIC III: THE PROCESS OF SOURCE SELECTION

The process of researching contemporary issues in science requires that students learn to utilize sophisticated source materials other than traditional instructional textbooks and encyclopedia. In that these contemporary issues are current and constantly undergoing modification, the students must become familiar with a different type of reference which will furnish the most recent scholarly, analytical and controversial information.

To fulfill these requirements, the students would learn to use primary and secondary sources: abstracts, journal articles, almanacs, dissertations, theses, government publications, handbooks and manuals, newspapers, societies and associations' yearbooks, magazines, actual observations and correspondence with experts in the field.

It is important that the students become proficient at recognizing objectivity and sound scientific research from reliable sources.

The following is a list of information sources and what these sources basically provide:

KINDS OF SOURCES:

A. Journal Articles

These are articles written by recognized scholars, professors, scientists, graduate and post-graduate students using recognized research methods to provide the scientific community with new or updated information.

These articles provide the most precise, scientifically documented information available and are among the most respected of all sources.

Examples: *American Journal of Human Genetics, Journal of the American Medical Association, Hastings Center Report, Virology, Journal of Reproductive Medicine, Economics and Neuroendocrinology.*

B. Abstracts (Summaries)

These are large indices published monthly that provide a brief statement of the main ideas in an article, book or case in court. The abstract contains all the information necessary to locating the journal article or periodical.

Examples: *Biological Abstracts, Biochemical Abstracts.*

C. Reputable Publications

These publications provide varying levels of investigative reporting which usually present an undistorted interpretation of the facts geared from the professional to the general public.

The treatment in reputable publications varies from very sophisticated as in *Scientific American* or *Science* to more popularly written as in *Popular Science, The New York Times* or *Newsweek.*

These publications are usually called Secondary Sources.

Examples:

1. Periodicals
   a. Professional Periodicals—*Scientific American, Science, The American Biology Teacher.*
   b. Association and Societies—*The Biology Teachers' Association.*
   c. Yearbooks—*Yearbook of Psychology, Biology* or *Psychology.*
   d. Popular Magazines—*Popular Science, Psychology Today, Popular Astronomy, Science News.*
2. Handbooks—*Handbook of Biological Methods.*
3. Manuals—*Manual of Psychology.*
4. Newspapers—*N.Y. Times, Asbury Park Press, Washington Post.*
5. Newscasts—Specials on television and radio.
6. Almanacs and Government Publications.

D. Affiliated Publications

These materials are designed to create and perpetuate a particular viewpoint. Their authors and articles are chosen to show their particular bias.

The student needs to be most aware of this type of publication since it takes a part of the truth and distorts it to the publication's own purpose.

Examples:

1. *American Opinion*—very conservative views
2. *Women*—a journal of "liberation"
3. *The Choice*—pro-laetrile publication
4. *Euthanasia Educational Council*—pro-euthanasia materials
5. Special Interest Groups—cigarette industry, coal industry, religious publications, etc.

E. Sensationalist Publications

The materials provided by these publications purposely distort the truth to sensationalize portions of the information provided to increase readership.

These articles have little or no scientific validity and should never be used for research project.

The student should be aware of varying degrees of sensationalism and be able to identify them even in popular tabloids.

Examples: *The National Enquirer, The Star, The N.Y. Post, The British Daily Mirror.*

ACTIVITIES FOR SOURCE SELECTION

1. Present the student with at least two (2) samples of articles from journals, abstracts, reputable publications, affiliated publications and sensationalist publications. You may wish to use the selections provided or ones of your own. Have students classify them into one of the five (5) categories.

   Generate a discussion to determine the qualities of each example and why it was placed in its particular category.
2. As a homework assignment, have the students locate at least one sample of each category and spend a classroom period to go over the results.

TOPIC IV: CRITERIA FOR SOURCE EVALUATION

After the student has mastered the skill of choosing appropriate scientific reference materials, it is important that we teach him to evaluate the source. Here are some guides to help him in carrying out the heavy responsibility of thinking for himself and evaluating a source.

A. Primary and Secondary Sources:

Is the document in question a primary source or a secondary source of information for your purpose? A primary source is a direct, first-hand document. An eye witness account or the account of the actual doer of a thing is potentially a primary source of information. Your primary source may be incompetent, murky or questionable, and there may be a temptation to alter the original findings by eloquent interpretations. This, however, does not help the researcher's situation as it only adds to the distortion. The only remedy is to enlarge our supply of primary sources, realizing their unique value and painful limitations.

The value of secondary sources depends largely upon the accuracy with which they record their findings, upon the quality of their interpretations, evaluations and reasoning, and the usefulness of their conclusions and applications. Although interpretation and evaluation may be helpful, it may mislead the student and stop original thinking.

B. The Writer:

1. *Does the writer have a first-hand knowledge of his subject?*
   If the author actually did the research or was a team member of a group, his writing is a primary source (a first source) because his effort produced this information. Of course, his research might be incompetent and laden with error, but we assume at least he has a certain competence about his topic.
2. *Does the writer have the reputation of being a reliable scholar?*
   Check the author in a good encyclopedia or in *Who's Who*. What are his credentials, degrees, official position, experience, and publications and how do they influence what he has written? Look up competent criticism and reviews of what he has written in publications like *A.L.A. Booklist* or *Book Review Di-*

gest. Remember, judgments of reviews are not final, and you should check other criticism to get an overall picture. Reputations of objective scholarship do develop and are important in your choice of primary sources.

3. *Is the writer biased?*
   Does the origin, sex, age, experience, reputation, employer, present circumstance, present affiliations and political persuasion suggest the probability of bias? Determination of bias is not easy to find as it could be unconscious or very subtle. Moreover, a possible bias does not necessarily invalidate a person's argument or his conclusions, but it throws doubt upon them and lessens their influence on the research.

C. The Work Itself:

1. *What is implied in the date of a work?*
   In many kinds of research, the historical dating has significance since dating would lead to a logical sequence of events. Check the copyright date. Once dating has been established, the document can be evaluated in the light of current findings and one can better estimate the value of the research and its conclusions. For example, an article on polio written in the early 1950's would not be of much practical use in the 1980's because of the many additional findings over the years.
2. *Does the publisher or the periodical in which the work appears suggest bias?*
   Some publications are supported by a church, university, or a private foundation, which may or may not dictate what shall be published and how. The control exercised may be complete and arbitrary or lax and negligible, and its significance varies.
   In evaluating a work, consider what you know about the publisher. Make allowance for any commitment or bias that this consideration may suggest.
3. *What is the opinion of critics concerning the work in question?*
   Is the work recommended in selected bibliographies and other standard reference books? Has the research been favorably reviewed? Try to determine the recommended qualities and about what, if anything, you should be careful.
4. *Does your general inspection of the work itself suggest some tentative appraisals of its probable value for your purpose?*
   Does the scope of the work as revealed on the title page and preface in the table of contents offer more or less of what you need? Does the author state the problem or hypothesis concisely? Does the author clearly define his terms? Does the author accurately report and interpret the data used and draw logical conclusions? Is the author using relevant sources to solve his problems? Is the author specific or general in his deductions and/or assumptions? Is the author stating facts or opinions? Is the author relating excerpts, statistics and other data in their true context? Does the author take into consideration all points of view? Does the author accurately evaluate the argu-

ment against his point of view? What is the intended audience of the research material? Is there exaggeration, obsession, unscrupulousness, personal meanness, professional enmity, a tendency to belittle or ridicule those who disagree, or a tendency to serve self-interest and reputation.
It is important to realize that a work may be valuable in spite of certain weaknesses, but they tend to detract from its weight.

5. *Does the documentation seem adequate in quality and quantity?*
As you read the source, determine how the writer knows the matter he is relating. Unless he writes his personal opinion or facts he has himself observed, his knowledge had to come from the outside media. With lesser known facts, a documentation is needed; direct quotes, statistics, thoughts or acts beyond the author's observation require careful and detailed reference to the form of footnotes and bibliography.

TOPIC V: PROCEDURE FOR TEACHING SOURCE SELECTION AND EVALUATION

The following section has specific articles or excerpts that the teacher can use in class to demonstrate the skills of source selection and evaluation.

This section is divided into two parts. Part I has a teacher's lesson plan and a general outline worksheet which the teacher can duplicate and which is universally applicable to each article included. The worksheet has general identification and evaluation skill questions which will enable the students to make wise choices of sources for their research.

Part II has some articles that the teacher might use to demonstrate source selection and evaluation. An index of the articles or excerpts is included.

PART I

A. TEACHER LESSON PLAN

TOPIC: Source Selection and Evaluation

AIM: What are the skills necessary for a student to choose critically and evaluate a source selection or a research paper?

Objectives:

1. To identify the name and author of an article, the date, and the name of the publication and publisher.
2. To show how the title page, preface, and table of contents can quickly reveal the usefulness of a source.
3. To determine whether a source is a primary or secondary source.
4. To ascertain the class of reference of the article, journal, abstract, reputable magazine, popular magazine, newspaper, newscast, afflicted publication, or sensationalist publications.
5. To be able to pick out the problem or hypothesis of a source.
6. To have the sophistication to know whether the author's paper is clearly written and defines his terms.

7. To detect if the author accurately reports and interprets the data used and draws logical conclusions.
8. To see if the author is using relevant sources to solve his problems.
9. To analyze if the author is specific or general in his deductions and/or assumptions.
10. To evaluate if the writer states facts or opinions and if he confuses facts with opinions.
11. To determine the intended audience of the research material.
12. To check if there is exaggeration, obsession, unscrupulousness, personal meanness, professional enmity, a tendency to belittle or ridicule those who disagree or a tendency to serve self-interest and reputation.
13. To detect if the writer has a first hand knowledge of his subject.
14. To discover by evidence if the author has the reputation of being a reliable scholar.
15. To learn to draw out the evidence whether or not the author has a personal bias.
16. To show how to find critical opinions of a source.
17. To determine if the documentation seems adequate in quantity and quality.
18. To understand why the date of a publication is valuable.
19. To identify if the publisher or the periodical in which the work appears suggests bias.

Development:

1. Develop the idea of a research paper by eliciting discussion.
   a. Establish a working definition of research.
   b. Derive realistic research expectations of high school students. Show a continuum on the board from very high to very low expectation.
   c. Determine what the value of research has already been in our society. Cite stories and examples of innovations developed out of research.
   d. Have the students discuss the characteristics of good research that make it valid. Develop what occurs when research is not valid.
2. Develop why sources must be carefully selected. Show excerpts of a few different sources and discuss their positive and negative qualities.
   a. List and explain the different possible sources.
   b. Discuss the characteristics of each of the specific sources.
   c. Provide a library lesson in which students can locate each of the different kinds of sources.

Source Evaluation:

1. Differentiate between primary and secondary sources. Give the students a few excerpts and have them determine whether they are primary or secondary sources.
2. Discuss the questions we must answer about the writer to evaluate effectively his work.

Activities:

1. Distribute to each student a copy of the general outline worksheet for each selection you use. Have the class read the worksheet silently while you read it aloud. Be sure that the students understand their task requires that they answer *all* the questions for *each* selection assigned.
2. From the source selection index, find and duplicate the source category you wish to teach. An exposure to each category would be ideal.
3. After the students complete their worksheet for each selection provide for classroom discussion on the quality of the sources.

B. Worksheet

The sample worksheet on the following pages is intended as a guide and aid for the teacher. The teacher may duplicate the worksheet or make any adaptations to it as he or she feels is necessary.

School_____ Name_____

Teacher_____ Date_____

GENERAL OUTLINE WORKSHEET FOR RESEARCH, SOURCE SELECTION AND SOURCE EVALUATION

Selection Number:

Instructions:

1. Read the article or excerpt carefully.
2. Answer each of the following questions based on the article you have just read.
3. Some answers will be quite easy to answer, while others will require longer and more thoughtful interpretations. If the article does not contain the information for a response, answer with "N/A" or "not available."
4. At the conclusion write your comments on the quality of the article and why you would or would not use it for a research paper.

Questions:

1. Identification Data
   a. Title and Author _____
   b. Publication and Date _____
   c. Publisher _____
2. Would you describe this as a primary or secondary source? Why?

   _____

   _____

   _____
3. Circle the class of reference of the article you have just read.

   a. Journal Article
   b. Abstract Article
   c. Reputable Magazine
   d. Popular Magazine
   e. Newspaper
   f. Newscast
   g. Affiliated Publication
   h. Sensationalist Publication

   Why did you choose this answer as the class of reference for this selection?

   _____

   _____

   _____
4. What is the problem or hypotheses of the selection?

   _____

   _____

5. State whether or not you feel the paper is clearly written and why.

_____

_____

6. How do you think the author compiled and reported data for the article?

_____

_____

7. What evidence can you cite that the author is using facts and not opinion?

_____

_____

8. Do you see any bias on the part of the publisher or publication? Explain.

_____

_____

9. Do you sense any personal bias on the part of the author? How?

_____

_____

10. Do you find evidence of any of the following: exaggeration, personal meanness, professional enmity, obsession, unscrupulousness, a tendency to belittle or ridicule those who disagree, or a tendency to serve self-interest and reputation? If so, please elaborate.

_____

_____

11. What evidence can you cite that the documentation seems adequate in quantity and quality?

_____

_____

12. CONCLUSION: Please write your comments on the quality of the article and why you would or would not use it for a research paper. _____

_____

_____

_____

_____

PART II
SOURCE SELECTION INDEX

1. *Journal Article*

   "Chromosome Translocations in Couples with Multiple Spontaneous Abortions." *American Journal of Human Genetics*, 34: August 1982.

   "Effect of Television Violence on Children and Youth." Journal of the American Medical Association (JAMA), December 1975.

2. *Abstract*

   "Endocrine Profile of Patients with Post Ligation Syndrome." *Journal of Reproductive Medicine*, 26 (7): 1981.

3. *Reputable Publications*

   a. Professional Periodical

      — "Lead Poisoning." *Scientific American* (excerpt) 244: February 1971.

      — "Experiments with the Role of Lipids in Cell-Membrane Permeability" (excerpt). *American Biology Teacher*, March 1970.

      — "No Time for Hysteria." *Staten Island Science Teachers Association Journal*. December 1979. Adapted from *The Journal of the American Medical Association*, 70 (9), 1979.

   b. *Popular Magazine*

      — "Babies Can Communicate at Birth." *The National Observer*, 1976.

      — "Health Update." *Better Homes and Gardens*, June 1982.

      — "RX for Water Pollution—Horseradish." *Technology Illustrated*, May 1982.

      — "Ice Cores—Clues to Past Climates." *Science News*, 7 November 1970.

      — "No Cal Sugar." *Science '81*, July August 1981.

   c. *Newspaper*

      — "Killer Bees' Approaching U.S. Revive Crop Fears." *N.Y. Times*, 13 July 1982.

      — "Low Calcium Tied to High Blood Pressure." *N.Y. Times*, 13 July 1982.

      — "The Cost of Research Dangers Finally Is Being Reckoned With," *N.Y. Times*, 18 February 1979.

4. *Affiliated Publications*

   Editorial. *American Opinion*, January 1982.

   "How Your Taxes Go to Fund the Left." *American Opinion*. March 1982.

   "Militarism and the Tradition of Radical Feminism." *Women—A Journal of Liberation*, Vol. 8 (1). December 1981.

5. *Sensationalist Publication*

   "New Youth Serum Adds 20 Years to Your Life." *National Examiner*, 8 April 1981.

Journal Article

"Chromosome Translocations in Couples with Multiple Spontaneous Abortions," *American Journal of Human Genetics*, 34: August 1982.

Chromosome Translocations in Couples with Multiple Spontaneous Abortions

VIRGINIA V. MICHELS,[1] CARLOS MEDRANO,[2] VICKIE L. VENNE,[2] AND VINCENT M. RICCARDI[2]

SUMMARY

The reported incidence of balanced chromosomal translocations in couples with multiple spontaneous abortions (SABs) ranges from 0% to 31%. Because our experience has suggested that SABs are useful for ascertaining balanced translocations, we report the results of chromosome analyses performed on blood specimens from 440 individuals including 200 couples who were ascertained on the basis of two or more SABs. Balanced translocations were found in 3.6% of these 200 couples. For 122 of these couples, more detailed reproductive histories were available. For 48 couples with two SABs, four (8.4%) had balanced translocations; for 37 couples with three SABs, one (2.7%) had a balanced translocation; for 20 couples with four SABs, two (10%) had balanced translocations; and for 17 couples with five or more SABs, one (5.9%) had a balanced translocation. These 122 couples could also be classified on the basis of having abnormal or healthy children. For 40 couples with two or more SABs, one or more healthy children, and no abnormal offspring, two (5.0%) had balanced translocations; for 20 couples with two or more SABs and one or more abnormal children (and in some cases one or more healthy children), one (5.0%) had a balanced translocation; for 62 couples with two or more SABs and no other pregnancies, four (6.5%) had balanced translocations.

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INTRODUCTION

The medical evaluation of couples presenting with a history of multiple spontaneous abortions often includes cytogenetic analyses. The reported incidence of balanced chromosomal translocations in these couples ranges from 0% [1] to 31% [2].

The reason for this wide variation is not clear. However, many of the studies do not include comparable groups of patients, and often the exact number of miscarriages, stillbirths, or abnormal offspring is not given, making comparison of studies even more difficult. For example, in one study, no balanced translocations were found in couples who presented with more than two SABs, while four of 16 couples with one or more SAB plus stillbirth(s) of children with multiple congenital anomalies (MCA) had a balanced translocation. Apparently, no couples with only two SABs were included in this study [3]. Another study was done prospectively, and 2.7% of individuals presenting with their third (or more) SAB were found to have a balanced translocation. Unfortunately, those with their first and second SAB were grouped together showing an overall frequency of balanced translocations of 0.6% [4]. A third study found one translocation carrier among 22 couples that had been referred for genetic counseling because of either a history of two or more SABs or stillbirths, but the number of couples with only SAB was not given [5]. A recent study was reported in which no balanced translocations were found in 100 couples [1]. In that study, ascertainment of couples was through a genetics clinic after or during a gynecologic evaluation (their method of ascertainment was similar to that used in our study, as discussed below). They also excluded couples if the reason for referral was an infant with MCA (as we have in our study). They carefully categorized couples according to numbers of miscarriages and other normal or abnormal offspring. However, they included only couples with two or more *consecutive* miscarriages, whereas in our study, the miscarriages occurred at any time during the respective couples' reproductive histories.

We report the results of chromosome analyses on 440 individuals including 200 couples with two or more SABs, for whom the overall frequency of translocation carriers was found to be 3.6%. Possible explanations for the variable results seen in similar studies will be discussed.

MATERIALS AND METHODS

All patients referred between January 1977 and March 1981 for cytogenetic analyses based on the indication of multiple SABs were included in our study. All but 10 referrals were initiated by the patients' obstetricians. All couples had a history of two or more SABs that were not necessarily consecutive. Couples were included even if they also had normal and/or abnormal offspring in addition to the miscarriages, but were excluded if the reason for the referral was the abnormal offspring. Specific information regarding number of SABs and number of normal and/or abnormal offspring was available for 122 couples.

Chromosome analyses were performed on routinely cultured peripheral blood lymphocytes. Slides were processed for trypsin-Giemsa banding. Eleven metaphases were microscopically analyzed, and one karyotype was prepared. Selected samples were processed for [illegible] analysis [6] if it was necessary to further define an abnormality or variation. [illegible] metaphases were analyzed when warranted, as, for example, in cases with

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RESULTS

Balanced translocations were found in eight of the 440 individuals (1.8%). These individuals included 200 couples, but in the remaining 40 patients, the spouses were unavailable for testing. Since a chromosome abnormality in the untested spouse would obviously not have been detected, the minimum incidence of balanced translocations per couple was 3.6%. The translocations were seen in all analyzed metaphases. The type of translocation for each patient is listed in table 1, along with the patient's age, the number of SABs, the number of normal children, and/or the number of abnormal offspring. The mean age for these balanced translocation carriers was 27.3 years; the mean age for all females in this study was 26.9 years, and for all males, 32.3 years.

Ten other chromosomal variations were observed and are listed in table 2. These included five cases of pericentric inversions of chromosomes other than chromosome 9. Also included were five cases of mosaicism for X-chromosome aneuploidy. The mean age of patients with mosaic X-chromosome aneuploidy was 31.8 years. For one of the cases with X chromosome aneuploidy, a repeat blood sample was obtained with the following results: 46,XX/47,XXX (98/2). This patient also had cultured skin fibroblast and bone marrow analyses that showed only 46,XX metaphases.

A complete reproductive history was available on 122 couples. These couples were divided into groups based on the number of miscarriages as shown in table 3. Forty-eight couples had two SABs, and four had a balanced translocation; 37 couples had three SABs, and one had a balanced translocation; 20 couples had four SABs, and two had a balanced translocation; and 17 couples had five or more SABs, and one had a balanced translocation. These same couples were then divided into different categories on the basis of whether they also had healthy or abnormal offspring (table 4). Sixty-two couples had two or more SABs, with no other offspring, and four had a balanced translocation; 20 couples had two or more SABs, one or more healthy children, and no abnormal offspring, and one

TABLE 1

BALANCED CHROMOSOMAL TRANSLOCATIONS IN EIGHT PATIENTS WITH SUMMARY OF REPRODUCTIVE HISTORY

CHROMOSOME ABNORMALITY	PATIENT INFORMATION			
	Age, yrs	No. SABs	No. healthy children	No. abnormal offspring
45,XX,rob(13;14)	27	4	1	0
46,XX,t(3p;13q)	26	4	0	0
46,XX,t(2q;4p)	30	2	1	0
46,XY,t(1q;5q)	29	2	0	0
46,XX,t(1q;5q)	NA*	3	0	0
46,XX,t(3q;8q)	27	NA	NA	NA
46,XX,t(3q;15q)	27	5	0	1 (stillborn)
46,XY,t(7q;12p)	25	2	0	0
Mean	27.3	3	...	...

* Information not available

dysplasia, apparently isolated congenital heart defect, cleft palate, or neural tube defect); and (2) for our referral population, when there were multiple SABs plus an abnormal child, the reason cited for parental chromosome analyses may be more likely to be the abnormal child, and such families would have been excluded from the current study.

There have been several studies in which other chromosomal variants such as pericentric inversions have been noted in couples with SABs [9]. Five pericentric inversions in chromosomes other than chromosome 9 were observed in this study; pericentric inversions of chromosome 9, and other variations such as prominent satellites, were not tabulated. Similarly, mosaicism for aneuploidy of the X chromosome has been noted in women who have had multiple SABs [1, 3, 11]. Those detected in our study had a very small number of abnormal cells, and there were no phenotypic abnormalities suggestive of Turner syndrome. Although increased fetal wastage has been reported in women with 45,X/46,XX karyotypes [12], the significance of the low degree of mosaicism seen in the peripheral blood in the women in this study is unknown. Because of the increasing frequency of X-chromosome mosaicism in peripheral blood lymphocytes in women with advancing age [13, 14], large numbers of metaphases using age-matched controls would be required to address the correlation of low-degree mosaicism with multiple SABs.

In conclusion, our study is in agreement with several previous studies that indicated an increased number of balanced chromosomal translocations in couples with two or more SABs over that in the general population. This increased number of translocation carriers is seen even when couples that have had abnormal offspring are excluded (although the frequency of carriers in the latter group may be higher). Since only chromosomal abnormalities, uterine malformations, and possibly certain hormonal deficiencies and infectious agents have been accepted as causes of multiple spontaneous abortions [15], two or more spontaneous abortions constitute a reasonable criterion for cytogenetic evaluation of couples presenting for evaluation of multiple miscarriages.

ACKNOWLEDGMENTS

Thanks to David Ledbetter, Gerald Holmquist, Richard Strobel, and Susie Airhart Ledbetter for assistance with the cytogenetics analyses and to Elizabeth Whitlow for assistance with manuscript preparation.

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The FOURTEENTH MILES INTERNATIONAL SYMPOSIUM will be held June 7–9, 1982, at the Johns Hopkins Medical Institutions, Baltimore, Maryland. The preliminary program includes sessions on: haploid cell fusion, protoplast fusion, hybridomas, cell fusion other than hybridomas, plant cell fusion, and monoclonal antibodies. For further information, contact: Edward G. Bassett, PhD, Symposium Coordinator, Miles Laboratories, Inc., P.O. Box 40, Elkhart, IN 46515. Phone: (219) 264-8460.

The VIIth CONGRESS OF HUMAN GENETICS will be held in the city of Zacatecas, Mexico, on September 29–October 2, 1982. For more information: Asociación Mexicana de Genética Humana, Apartado Postal 12-799, 03020 Mexico 12, D.F.

Journal Article

"Effect of Television Violence on Children and Youth." *Journal of the American Medical Association* (JAMA), December 1975.

• One hundred forty-six articles in behavioral science journals, representing 50 studies involving 10,000 children and adolescents from every conceivable background, all showed that violence viewing produces increased aggressive behavior in the young and that immediate remedial action in terms of television programming is warranted.

Four major issues are covered: effects on learning, emotional effects, the question of catharsis, and effects on aggressive behavior. The research findings regarding each of these issues are summarized, as well as the controversial 1972 Surgeon General's report, *Television and Social Behavior.*

The time is long past due for a major, organized cry of protest from the medical profession in relation to what, in political terms, I consider a national scandal.

(*JAMA* 234:1043-1046, 1975)

Michael B. Rothenberg, MD

From the departments of psychiatry and behavioral sciences and pediatrics, University of Washington School of Medicine, and the Children's Orthopedic Hospital and Medical Center, Seattle.

AS A people, we Americans are not unaccustomed to violence. Its thread is woven into the entire fabric of our history, from frontier lawlessness through Chicago gangsterism to presidential assassination. Consider the following statistics, printed on the editorial page of the Oct 12, 1974, issue of the *San Francisco Chronicle*.

There are an estimated 200,000,000 guns in the United States, which averages out to one for almost every man, woman and child in the country. A new hand gun is sold every 13 seconds and used ones are traded at the rate of one every 30 seconds. Five million new ones come off assembly lines every year for civilian purchase.

Every four minutes someone is killed or wounded by gunfire. Every three minutes someone is robbed at gunpoint.

On the basis of Nielsen Index figures, the average American child will have viewed some 15,000 hours of television by the time he has been graduated from high school, as compared with his having been exposed to some 11,000 hours of formal classroom instruction. He will have witnessed some 18,000 murders and countless highly detailed incidents of robbery, arson, bombing, forgery, smuggling, beating, and torture—averaging approximately one per minute in the standard television cartoon for children under the age of ten. There is an average of six times more violence during one hour of children's television than there is in one hour of adult television.

Twenty-five percent of the television industry's profit comes from the 7% of its programming directed at children. While the Code of Hammurabi in 2250 BC made selling something to a child or buying something from a child without power of attorney a crime punishable by death, in 1975 AD our children are exposed to some 350,000 television commercials by the time they reach age 18, promising super-power, sugar-power, toy-power, and kid-power.

Finally, against this backdrop, consider these words of Walt Whitman:

There was a child went forth every day,
and the first object he look'd upon, that object he became,
and that object became part of him for the day or a certain part of the day
or for many years or stretching cycles of years.[1]

The Issues

The literature describing research on the effects of television violence on children has been growing steadily in quantity and quality for the past 25 years. Almost all of it has appeared in social and behavioral science publications, with remarkably little representation in medical journals. Because so much of the research done in this area uses Bandura's[2] social learning theory as at least part of its conceptual framework, we should remind ourselves that this theory states that role models act as stimuli to produce similar behavior in the observer of the role model. This behavior is learned by being imitated, rewarded, and reinforced in a variety of ways. Responses produced often enough and over a long enough period of time maintain the behavior. Bandura outlines three steps necessary for this process: *exposure* to the stimulus, *acquisition* of the "message" being transmitted by the role model, and *acceptance* of that "message."

For practical purposes, I have listed in the references to this article only nine recent reviews of the literature on this subject.[1-11] Because it outlines so succinctly what the vast majority of these well-designed and statistically significant studies conclude, I would like to concentrate on Richard Goranson's "A Review of Recent Literature on Psychological Effects of Media Portrayals of Violence."[12] Goranson identifies four major issues:

1. Effects on Learning.—Are children likely to learn and remember new forms of aggressive behavior by watching the kind of violence pre-

From the Department of Psychiatry and Behavioral Science and Pediatrics, University of Washington School of Medicine, and the Children's Orthopedic Hospital and Medical Center, Seattle, WA. Reprinted from *Journal of the American Medical Association*, December 8, 1975. Copyright • 1972 American Medical Association.

sented in the mass media? What are the conditions, if any, that encourage the actual performance of aggressive acts learned through the media?

2. Emotional Effects.—Does the repetition of violence in the mass media result in a decreased emotional sensitivity to media violence? Is a decreased emotional sensitivity likely to have any implications for the probability of actual aggressive behavior in real-life situations?

3. The Question of Catharsis.—Does watching the kind of aggression shown in the media result in "aggression catharsis"—a "draining off of aggressive energy"? Does the observation of pain, horror, and suffering result in catharsis?

4. Effects on Aggressive Behavior.—Are there any conditions of observed violence that can serve either to inhibit or to facilitate aggression?

Here is a summary of the research findings regarding each of these issues:

1. Novel, aggressive behavior sequences are learned by children through exposure to aggressive actions shown on television or in films. A large proportion of the aggressive behaviors learned by observation are retained over long periods of time if the responses have been practiced at least once. The following conditions encourage the actual performance of aggression: a similarity between the observed setting and the viewer's real setting; when the observed aggression "worked"; when it wasn't punished; and when it was the favored and most frequent method used to attain goals.

2. There is a decreased emotional sensitivity to media violence, as a result of the repetition of violence in the mass media. Classical desensitization takes place, as practiced in modern behavior therapy. There is a decreased aggression anxiety and an increased ability to be violent with others.

3. The original studies of Feshbach,[11] which purported to demonstrate "aggression catharsis," have never been replicated and have been disproved by a number of other studies. These other studies have shown the opposite of catharsis, ie, an increase in the viewer's subsequent aggressiveness. There has been no evidence that the observation of pain, horror, and suffering results in catharsis. Goranson speculates that the persistence of a belief in the aggression catharsis notion may stem from a misapplication of Aristotle's original concept of catharsis, which applied only to the "tragic" feelings of grief and fear that could be discharged through active expression by the audience during the performance.

4. Aggression can be inhibited by (1) reminders that the aggression was morally wrong in terms of the viewer's own ethical principles and (2) an awareness of the bloody, painful aftermath of aggression.

Aggression can be facilitated by (1) the cue properties of available targets, ie, stimuli in the postobservation period that have some association with previously observed violence—an association between the victim of the observed violence and the target of the viewer's aggression—and (2) the general state of arousal of the aggressor, eg, when, in experimental settings, the subject is verbally attacked and then exposed to film violence, he later is more aggressive than one who wasn't attacked before being exposed to film violence.

Surgeon General's Report

Television and Social Behavior—A Technical Report to the Surgeon General's Scientific Advisory Committee on Television and Social Behavior was published in 1972. This five-volume report, summarizing the results of 23 separate research projects, comes to the same conclusions as Goranson did in 1969—and as researchers did as far back as 1950. Why, then, does so much controversy persist about this Surgeon General's Report?

The controversy arises from the sixth volume of this report, a summary volume written by the Scientific Advisory Committee. It is important to note that when this 12-person committee was being formed, a list of 40 social and behavioral scientists who had been recommended to the Surgeon General's office by the academic community for membership on this committee was presented to representatives of the television industry. The television industry representatives "blackballed" the seven of the 40 listed scientists who had the most outstanding reputations and work in the field of violence research. These seven were replaced by five television network executives. In addition, there was enormous political pressure on the Scientific Advisory Committee to produce a unanimously signed document. As a result, the summary, while it concludes that a causal relationship between violence viewing and aggression by the young was found, is worded so as to lead to misunderstanding. And the *summary* of the summary is flatly misleading, repeatedly using words such as "preliminary," "tentative," and "however" as qualifiers for statements concerning causal relationship.

Liebert et al,[7] who did some of the research for the Surgeon General's Report, published a book in 1973 in which they offer a painstaking and brilliant review of this entire subject and of the Surgeon General's Report itself. They point out that 146 published papers representing 50 studies—laboratory studies, correlational field studies, and naturalistic experiments—involving 10,000 children and adolescents from every conceivable background all show that violence viewing produces increased aggressive behavior in the young and that immediate remedial action in terms of television programming is warranted.

Other Issues

There are a number of other issues involved that are not central to our concern here with the effects of television violence on children and youth. They deserve at least to be listed: the relationship of child development issues to the content of current television programs (in a word, *none*); the racial, sexual, child, and adult stereotypes portrayed on television; and the effect of television commercials on children's eating habits (an average of 23 commercials an hour, some 60% of which advertise sugar-coated cereals, cookies, snacks, and candy).

The FCC and the NAB

The National Association of Broadcasters (NAB) has a television code that states in part:

Television is seen and heard in every type of American home. These homes include children and adults of all ages, embrace all races and all varieties of religious faith,

and reach those of every educational background. It is the responsibility of television to bear constantly in mind that the audience is primarily a home audience, and consequently that television's relationship to the viewers is that between guest and host. . . . By law the television broadcaster is responsible for the programming of his station. He, however, is obligated to bring his positive responsibility for excellence and good taste in programming to bear upon all who have a hand in the production of programs, including networks, sponsors, producers of film and of live programs, advertising agencies, and talent agencies. . . .

Television and all who participate in it are jointly accountable to the American public for respect for the special needs of children, for community responsibility, for the advancement of education and culture, for the acceptability of the program materials chosen, for decency and decorum in production, and for propriety in advertising. This responsibility cannot be discharged by any given group of programs, but can be discharged only through the highest standards of respect for the American home, applied to every moment of every program presented by television.

In order that television programming may best serve the public interest, viewers should be encouraged to make their criticisms and positive suggestions known to the television broadcasters. Parents in particular should be urged to see to it that out of the richness of television fare, the best programs are brought to the attention of their children. . . .

The presentation of techniques of crime in such detail as to invite imitation shall be avoided. . . . Violence and illicit sex shall not be presented in an attractive manner, nor to an extent such as will lead a child to believe that they play a greater part in life than they do.

Racial or nationality types shall not be shown on television in such a manner as to ridicule the race or nationality.

Television broadcasters should exercise the utmost care and discrimination with regard to advertising material, including content, placement and presentation, near or adjacent to programs designed for children. No considerations of expediency should be permitted to impinge upon the vital responsibility towards children and adolescents, which is inherent in television and which must be recognized and accepted by all advertisers employing television.

On the basis of the evidence presented, one can only conclude, as did Liebert and colleagues, that the NAB code "appears to be just a public relations document never intended to guide actual practices." Indeed, on at least one documented occasion in 1963, when the Federal Communications Commission (FCC) attempted to control excessive commercialism in television by suggesting that the NAB's own code be used to set the guidelines, the NAB opposed the plan of using its own code and actually organized committees in each state to lobby against it!

In 1968 a consumer organization, Action for Children's Television (46 Austin St, Newtonville, MA 02160), was formed. It was largely through the efforts of this organization and other consumer groups that the FCC developed some new guidelines for children's television in November 1974. All broadcasters are supposed to be in full compliance with these new guidelines by Jan 1, 1976, but there is no evidence from current programming or from announcements of fall 1975 programming that any substantive move toward such compliance has been made.

Some Recommendations and Comments

It is important to remind ourselves that *prosocial* behaviors can also be produced and encouraged by television. The best known example of this is "Misterogers' Neighborhood." There are a number of others, such as "Call It Macaroni," produced by Westinghouse in New York, which takes a group of children to a different part of the country from the one in which they live and teaches them something they have never known or done before; "Big Blue Marble"; "Rainbow Over Seven"; and "Fat Albert and the Cosby Kids."

It would seem to me that the time is long past due for a major, organized cry of protest from the medical profession in relation to what, in political terms, is a national scandal. Such an outcry can and should be accompanied by specific recommendations, based on sound child development principles and the hard data already available to us from 25 years of investigation of the relationship of television violence and aggressive behavior in children, for new kinds of television programming for children and youth.

San Francisco's Committee on Children's Television, Inc (1511 Masonic Ave, San Francisco, CA 94117), a nonprofit organization established by a racially diverse group of parents and professionals dedicated to improving children's television programs through research and an affirmative, active plan for community participation in broadcasting, has developed a set of *General Guidelines for Selecting Television Programming for Children*. These guidelines should be available in every doctor's office, hospital clinic, and child health station. They are as follows:

1. Does the program appeal to the audience for whom intended? (A program for 12-year-olds should be different from a program for 6-year-olds.)
2. Does the program present racial groups positively and does it show them in situations that enhance the Third World child's self-image? (Who has the lead roles? Who is the professional or leader and who is the villain?)
3. Does the program present gender roles and adult roles positively? (Are the men either super-heroes or incompetents? Are the women flighty and disposed to chicanery? Are teenagers portrayed with adult characteristics?)
4. Does the program present social issues that are appropriate for the child viewer and perhaps are something a child can act on at a child's level? (Litter versus atomic fallout, or pet care versus saving wolves.)
5. Does the program encourage worthwhile ideals, values and beliefs?
6. Does the program present conflict that a child can understand and does it demonstrate positive techniques for resolving the conflict?
7. Does the program stimulate constructive activities and does it enhance the quality of a child's play?
8. Does the program separate fact from fantasy? Does it separate advertisements from program content?
9. Does the program present humor at a child's level? (Or is it adult sarcasm, ridicule or an adult remembering what he thought was funny from his childhood?)
10. Does the program have a pace that allows the child to absorb and contemplate the material presented?
11. Does the program have artistic qualities?
12. Has your child seen an appropriate amount of television for the day? (Or is it time to turn off the set?)

Children have neither money nor the vote. We, as parents and as professionals, must be their advocates or they shall have none, for they are

certainly no politician's constituency.

As Williams and Crane[14] have said, "To be silent is to acquiesce, and it is clear that, if we truly care about our children, we cannot be silent."

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Abstract

from *Biological Abstracts* 73 (2) 1981.

differences in testosterone levels compared to control groups. Some postpuberal patients with pathological sperm analyses had elevated LH [lutropin] and FSH levels as a consequence of the disturbed spermatogenesis. GnRH [gonadoliberin] stimulation tests in 12 prepuberal patients showed a normal elevation of LH and FSH levels; 22 postpuberal patients with pathological sperm analyses showed hypergonadotropism with markedly elevated LH and FSH levels after GnRH.

9431. OKUYAMA, AKIHIKO*, NAOMITSU NISHIMOTO, TOSHIAKI YOSHIOKA, MIKIO NAMIKI, HIROAKI ITATANI, MINATO TAKARA, SHUTARO MIZUTANI, TOSHIHIRO AONO, KEISHI MATSUMOTO and TAKAO SONODA. (Department of Urology, Osaka Univ. Hosp., Fukushima 1-1-50, Fukushimaku, Osaka 553, Japan.) EUR UROL 7(5): 274-277. 1981. **Gonadal findings in cryptorchid boys with Noonan phenotype.**—Seven patients with Noonan's syndrome, aged 5-16 yr, complicated by bilateral cryptorchidism were examined by LHRH and HCG [human chorionic gonadotropin] stimulation tests, long-term HCG stimulation and testicular biopsy. Two patients showed a good response and there were no effects in the remainder. Histological examination of the testes confirmed interstitial fibrosis in every case and showed abnormalities of the seminiferous tubules in 4 patients while in 1 patient the seminiferous tubules were composed of spermatocytes and spermatids. These hormonal and histological findings show different patterns of disturbance of the pituitary-gonadal system in male patients with Noonan's syndrome.

9432. BIFFIGNANDI, P., C. MANIERI, M. MASSOBRIO, S. MAZZOCCHI, M. MESSINA and G. M. MOLINATTI*. (Univ. Turin, Corso Polonia 14, 10126 Turin, Italy.) PANMINERVA MED 23(1): 1-4. 1981. **Androgen receptors: A quantitative investigation in female unexplained hirsutism.**—The pathogenetic theories concerning unexplained female hirsutism prompted the study of the behavior of androgen receptors in this condition. Data obtained showed a decreased concentration of androgen receptor proteins in the skin of hirsute patients. Three working hypotheses are discussed to explain this phenomenon.

9433. EMEL'YANOV, E. A. (Div. Obstet. Gynecol., Volgogr. Med. Inst., Volgograd, USSR.) VOPR OKHR MATERIN DET 25(8): 61-63. 1980. [In Russ. with Russ. and Engl. summ.] **Problem of prognosticating lactation.**—Some vegetative-endocrine parameters of milk gland functions were studied in 31 pregnant women and 222 puerperants with normal and diminished lactation. In puerperants with hypogalactia: reduced estriol during pregnancy and prolactin content after labor, less pronounced accents of the active points on the milk gland skin, and the prevalence of pressor vascular reactions and a lower tone of the sympathico-adrenal system were noted.

9434. HARGROVE, JOEL T.* and GUY E. ABRAHAM. (820 Hatcher Lane, Columbia, Tenn. 38401.) J REPROD MED 26(7): 359-362. 1981. **Endocrine profile of patients with post-tubal-ligation syndrome.**—The endocrine profile of the midluteal phase was assessed in 29 patients with the post-tubal-ligation syndrome, consisting of pain, bleeding and premenstrual tension. Compared to normal controls, the patients had a high serum estradiol and a low serum progesterone level. This abnormal luteal function may be responsible for the symptoms observed and may also explain the failure to conceive following successful reversal of tubal ligation. Patients seeking sterilization reversal should be screened for abnormal luteal function preoperatively. Selection of sterilization procedures that minimize alteration in luteal function should be given high priority.

9435. CORSON, STEPHEN L.*, CARL J. LEVINSON, FRANCES R. BATZER and CHARI OTIS. (Phila. Fertility Inst., 330 S. 9th St., Philadelphia, Pa. 19107.) J REPROD MED 26(7): 363-370. 1981. **Hormonal levels following sterilization and hysterectomy.**—Hysterectomy patients and women sterilized either by bipolar electrocoagulation or the occlusive-ring technique showed no change in midluteal progesterone levels as compared with control patients.

9436. HIROKAWA, MAKOTO*, TERUAKI IWAMOTO*, HIROSHI FUJII*, KAZUHIKO SATO*, KAZUHIKO MATSUSHITA and SHIGEO ASAKURA. (Dep. Urol., Fujisawa City Hosp.) JPN J FERTIL STERIL 26(3): 38-43. 1981. [In Jpn. with Jpn. and Engl. summ.] **Testosterone levels of peripheral and internal spermatic vein blood in patients with varicocele.**—The secretion of androgens by normal and varicocele testis was compared by determining testosterone concentrations. The testosterone concentrations were measured in peripheral and internal spermatic venous plasma from 53 patients with varicocele. In 24.5% of the patients the peripheral testosterone concentrations were below 3.00 ng/ml. The testosterone level in human internal spermatic vein blood varies from 3.0-950 ng/ml (mean value 203.5 ± 187(SD) ng/ml). In 34% of the patients the internal spermatic testosterone concentrations were below 100 ng/ml. Most cases of the varicocele group had spermatic vein testosterone to peripheral ratios lower than the normal group. There were significant differences in spermatic vein testosterone levels in the varicocele group when compared with the hernia control group. The internal spermatic testosterone concentrations were significantly decreased in patients with severe hypospermatogenesis. Varicoceles could result in testicular disturbances which in turn affect testosterone secretion by Leydig cells.

9437. WEAKER, FRANK J.* and P. J. SHERIDAN. (Dep. Anat., Univ. Texas Health Sci. Cent. at San Antonio, 7703 Floyd Curl Drive, San Antonio, Tex. 78284.) AM J OBSTET GYNECOL 140(6): 624-628. 1981. **Androgen uptake in the female reproductive system of a nonhuman primate.**—The nuclear uptake and retention of ^{3}H-dihydrotestosterone (^{3}H-DHT) were studied in the reproductive organs of the female rhesus monkey by autoradiography. Ovariectomized and adrenalectomized adult female monkeys were injected with 1 μg of ^{3}H-DHT (107 Ci/mmol) and were exsanguinated 1 h later. The uterus, cervix, vagina and fimbriae of the fallopian tubes were removed and processed for autoradiography. Localization of the androgen was observed in the nuclei of fibroblasts, but not in the nuclei of smooth muscle and tissue of the blood vessels, of all 4 organs. The uptake of androgen by the epithelium varied for each organ. The simple columnar epithelium of the fallopian tube demonstrated nuclear labeling, but the epithelium of the uterus did not. The cells of the germinative layer of the stratified squamous epithelium of both the cervix and vagina exhibited nuclear concentration of label; the simple columnar epithelium of the cervix contiguous with the uterus was free of label. Androgens may have a physiologic role in the female reproductive organs, and the therapeutic effect of drugs such as danazol may be mediated via an androgen receptor.

9438. MCGINNIS, MARILYN Y., LEWIS C. KREY*, NEIL J. MACLUSKY and BRUCE S. MCEWEN. (Rockefeller Univ., 1230 York Ave., New York, N.Y. 10021.) NEUROENDOCRINOLOGY 33(3): 158-165. 1981. **Steroid receptor levels in intact and ovariectomized estrogen-treated rats: An examination of quantitative, temporal and endocrine factors influencing the efficacy of an estradiol stimulus.**—Cell nuclear estrogen receptors and cytosol progestin receptors were measured in the pituitary gland, preoptic area and hypothalamus throughout the estrous cycle of the rat. Cell nuclear estrogen receptor levels paralleled changes in serum estradiol concentrations with highest values on proestrus and lowest on diestrus. Proestrous values were 50-60% of capacity for each tissue. Cytosol progestin receptor number in these tissues was also highest on proestrus and lowest on diestrus. With these data as a guide, Silastic capsules filled with estradiol-cholesterol mixtures were used to generate physiologic levels of estrogen receptor occupation within the brain-pituitary complex of ovariectomized rats and to examine the kinetics of estradiol stimulation of lordosis behavior and cyclic gonadotropin release. The effectiveness of an estradiol stimulus to elicit lordosis or luteinizing hormone release apparently depends on at least 3 factors: the magnitude of the increment in serum estradiol and brain and pituitary cell nuclear estradiol receptor level, the duration over which these increments are maintained and the interval from previous exposure to estrogen.

9439. MATSUMOTO, AKIRA* and YASUMASA ARAI. (Dep. Anatom. Juntendo Univ. Sch. Med., Hongo, Tokyo 113.) NEUROENDOCRINOLOGY 33(3): 166-169. 1981. **Effect of androgen on sexual differentiation of synaptic organization in the hypothalamic arcuate nucleus: An ontogenetic study.**—Wistar female rats were treated with 1.2^a mg testosterone propionate (TP) on day 5 (day of birth = day 1). The hypothalamic arcuate nucleus (ARCN) in the brains of normal and neonatally TP-treated (androgenized) females was examined ultrastructurally at 6, 10, 20, 45 and 100 days of age. Axodendritic shaft and spine synapses were counted in a field of 10,000 μm^2 of the neuropil in the middle part of the ARCN in each brain. The mean numbers of shaft and spine synapses both in normal and androgenized females increased from days 6 to 45, and reached a plateau by day 45. The mean number of shaft synapses in androgenized females was not significantly different from that in normal controls at each age. No significant difference in the number of spine synapses between normal and androgenized rats was seen 1 day after TP administration (sacrificed at 6 days of age). The incidence of spine synapses in androgenized females 5 days after TP injection (sacrificed at 10 days of age) was significantly smaller than that in the controls. This tendency became much clearer during the course of postnatal development. Since the synaptic organization of the ARCN in normal adult males is quite homologous to that observed in the androgenized adult females androgen given neonatally apparently is responsible for sexual differentiation of the synaptic pattern in the ARCN and this synaptic difference develops from the early postnatal period.

9440. COOKE, B. A.*, ROZANNE MAGEE-BROWN, M. GOLDIN and C. J. DIX. (Dep. Biochemistry, Chemistry, Royal Free Hosp. Sch. Med. Univ. London, 8 Hunter St., London, WC1 N1BP, UK.) INT J ANDROL 4(3): 355-366. 1981. **The heterogeneity of Leydig cells from mouse and rat testes: Evidence for a Leydig cell cycle?**—A method for purifying Leydig cells by centrifugation of testes cells on continuous density gradients of Percoll was investigated. The distribution of Leydig cells in the separated bands of cells obtained and their receptor content and testosterone production after addition of lutropin (LH) was measured. In agreement with previous work, highly pure mouse Leydig cells (average density 1.070 g/ml) could be prepared by this method. These cells responded to LH and produced high amounts of testosterone (1-4 μg/10^6 cells per 2 h), and bound [^{125}I]hCG [human chorionic gonadotropin] specifically (25-64 f[femto]mol hCG bound/10^6 cells). Similarly from rat testes, Leydig cells (average density 1.072 g/ml) were purified. These cells also responded to LH and produced 5-25 ng testosterone/10^6 cells per 2 h and bound [^{125}I]hCG specifically (3-18 fmol hCG bound/10^6 cells). Two other bands of nucleated cells of lower density (~ 1.045 and 1.0 g/ml) were formed on the gradients from both mouse and rat testes. B-

Reputable Publication
excerpt from "Lead Poisoning," *Scientific American*, 224: February 1971.

Lead Poisoning

Among the natural substances that man concentrates in his immediate environment, lead is one of the most ubiquitous. A principal cause for concern is the effect on children who live in decaying buildings

by J. Julian Chisolm, Jr.

Lead has been mined and worked by men for millenniums. Its ductility, high resistance to erosion and other properties make it one of the most useful of metals. The inappropriate use of lead has, however, resulted in outbreaks of lead poisoning in humans from time to time since antiquity. The disease, which is sometimes called "plumbism" (from the Latin word for lead) or "saturnism" (from the alchemical term), was first described by the Greek poet-physician Nicander more than 2,000 years ago. Today our concerns about human health and the dissemination of lead into the environment are twofold: (1) there is a need to know whether or not the current level of lead absorption in the general population presents some subtle risk to health; (2) there is an even more urgent need to control this hazard in the several subgroups within the general population that run the risk of clinical plumbism and its known consequences. In the young children of urban slums lead poisoning is a major source of brain damage, mental deficiency and serious behavior problems. Yet it remains an insidious disease: it is difficult to diagnose, it is often unrecognized and until recently it was largely ignored by physicians and public health officials. Now public attention is finally being focused on childhood lead poisoning, although the difficult task of eradicating it has just begun.

Symptomatic lead poisoning is the result of very high levels of lead in the tissues. Is it possible that a content of lead in the body that is insufficient to cause obvious symptoms can nevertheless give rise to slowly evolving and long-lasting adverse effects? The question is at present unanswered but is most pertinent. There is much evidence that lead wastes have been accumulating during the past century, particularly in congested urban areas. Increased exposure to lead has been shown in populations exposed to lead as an air pollutant. Postmortem examinations show a higher lead content in the organs of individuals in highly industrialized societies than in the organs of most individuals in primitive populations. Although no population group is apparently yet being subjected to levels of exposure associated with the symptoms of lead poisoning, it is clear that a continued rise in the pollution of the human environment with lead could eventually produce levels of exposure that could have adverse effects on human health. Efforts to control the dissemination of lead into the environment are therefore indicated.

The more immediate and urgent problem is to control the exposure to lead of well-defined groups that are known to be directly at risk: young children who live in dilapidated housing where they can nibble chips of leaded paint, whiskey drinkers who consume quantities of lead-contaminated moonshine, people who eat or drink from improperly lead-glazed earthenware, workers in certain small-scale industries where exposure to lead is not controlled. Of these the most distressing group is the large group of children between about one and three to five years of age who live in deteriorating buildings and have the habit of eating nonfood substances including peeling paint, plaster and putty containing lead. (This behavior is termed pica, after the Latin word for magpie.) The epidemiological data are still scanty: large-scale screening programs now in progress in Chicago and New York City indicate that between 5 and 10 percent of the children tested show evidence of asymptomatic increased lead absorption and that between 1 and 2 percent have unsuspected plumbism. Small-scale surveys in the worst housing areas of a few other cities reveal even higher percentages.

There is little doubt that childhood lead poisoning is a real problem in many of the older urban areas of the U.S. and perhaps in rural communities as well. Current knowledge about lead poisoning and its long-term effects in children is adequate to form the basis of a rational attack on this particular problem. The ubiquity of lead-pigment paints in older substandard housing and the prevalence of pica in young children indicate, however, that any effective program will require the concerted and sustained effort of each community. Furthermore, the continued use of lead-pigment paints on housing surfaces that are accessible to

Reputable Publication

excerpt from "Experiments with the Role of Lipids in Cell-Membrane Permeability," *The American Biology Teacher*, March 1970.

Experiments with the Role of Lipids In Cell-Membrane Permeability

O. ROGER ANDERSON, Teachers College, Columbia University

The plasma membrane is a component of all living cells. It forms the boundary of the cell and effectively delimits the living cytoplasm from the surrounding environment. Moreover, as a lipoprotein envelope it exerts a direct influence on the movement of molecules across the cell boundary. Electron microscopy confirms that the architecture of the cell is a framework of membranous elements resembling the plasma membrane. Ratios of lipid to protein vary with the location and function of the membrane.

This article (i) discusses recent research in the role of lipids in cell-membrane permeability; (ii) suggests experiments adapted to the biology classroom at the junior and senior high school levels; and (iii) evaluates the responses of a number of students who undertook the experiments.

THEORY AND RECENT RESEARCH

Among the several widely accepted models of the structure of the cell membrane, that of Danielli and Davson (1935) has gained prominence. These authors proposed a laminated lipoprotein structure containing an internal lipid bilayer covered on each outer surface by a protein layer. Electron micrographs of natural cell membranes (Staehlin, 1968; Korn, 1968) and artificial membrane systems (Stoeckenius, 1959; Bangham and Horne, 1964; Bangham and Haydon, 1968; Anderson *et al.*, 1967) support the hypothesis that the membrane is laminated. Wallach and Zahler (1966), however, disputed the claim that the protein is largely distributed as a sheet on the surface of the membrane. Their infrared spectroscopic data indicated predominately globular proteins (α-helices) rather than sheet proteins (β-keratin). Regardless of the disposition of membrane protein, many cell biologists agree that the organization of the lipid layer is more than trivial in controlling membrane permeability. If the lipid does indeed form a bilayer at the cell surface (Bar, Deamer, and Cornwell, 1966), then passage of polar molecules across these hydrophobic boundaries would be inhibited. The selective permeability of the lipid layer to molecules would depend on the chemical structure of the diffusing molecule and the composition of the membrane lipids. Some organic molecules selectively interact with specific membrane lipids, thereby enhancing their diffusion across the lipid layer.

For thermodynamic reasons, Danielli (1966) concluded that a lipid bilayer is the most probable membrane lipid configuration. His theoretical calculations showed that the bilayer has the lowest surface-free energy when compared with a single-layered or multilayered lipid system.

Recently a number of studies of cell membrane permeability have been performed, using model lipid systems. Lipid monolayers or bilayers were formed at an aqueous interface and the permeability of the lamellae was studied. One of the earliest studies was performed by Bangham and his associates (Bangham and Haydon, 1968; Bangham, Standish, and Watkins, 1965). They found that ovolecithin alone or mixtures of ovolecithin and cholesterol formed spherules in aqueous dispersion. When observed with the electron microscope, negatively stained spherules contained concentric lamellae. The electron translucent lipid lamellae were separated by an electron opaque band where the aqueous stain had penetrated between the lipid layers. Fig. 1 is an electron micrograph of a lipid spherule with concentric lamellae (Anderson *et al.*, 1967). Fig. 2

Reputable Publication

"No Time for Hysteria." *Staten Island Science Teachers Association Journal,* December 1979.

NO TIME FOR HYSTERIA

Leslie L. Alexander, MD

(Reprinted from the *Journal of the National Medical Association* Vol. 71, No. 9, 1979)

Although several months have passed since the March 28th accident at the Three Mile Island Nuclear Station, hardly a day goes by without mention of this unfortunate incident on the radio, television, or in the press.

That there is concern regarding the consequences of this nuclear incident is abundantly evident. A recent news release about the death of several cows in the Harrisburg farm area typifies the anxiety associated with possible nuclear mishap. Luckily, however, the carcasses revealed no signs of radioactivity on post-mortem examination.

Similar apprehension has been observed in many other lands. Government officials in Sweden, Denmark, and West Germany, as well as anti-nuclear activists almost everywhere have demanded that nuclear plants be shut down. In Japan, where 19 nuclear reactors produce 11 percent of the electricity, and in Italy and France, no changes in energy policy are contemplated.[1] Empasis on increased safety measures as alternatives was suggested.

On a more local scene, Governor Hugh Carey of New York reaffirmed his opposition to the building of nuclear power plant on Long Island, and other high officials "expressed serious reservations about the future use of nuclear energy in the State."[2] Similar high level anguish has been observed in many other states. Even Columbia University has announced plans to delay operation of a research nuclear reactor in its school of engineering.[3] Also concerned are many ranking congressmen who are demanding new laws granting tighter federal controls over the operation of nuclear reactors and more emphasis on coal as source of energy

A pervasive concern of modern physicians since the era of Hiroshima and Nagasaki has been the catastrophic potential for injury from accidental or intended release of radioactivity. What now has been the population dose of radiation from what has been described as the worst nuclear accident in the nation's history?

A preliminary appraisal of the health impact of the nuclear accident at the Three Mile Island Nuclear Station during the period of March 28 through April 7, 1979, has been released recently by an Ad Hoc Population Dose Assessment Group.[4] This group consists of staff scientists from the Department of Health, Education, and Welfare, the Environmental Protection Agency (EPA), and the Nuclear Regulatory Commission (NRC). A final report will be prepared by EPA. Judging by a preliminary review of data from periods beyond April 7, 1979, however, it appears that initial estimates will not change significantly.

This report is a startling assessment of the health impact on the approximately two million offsite residents within 50 miles of the Three Mile Island Nuclear Station. The dose and health effects estimates are based primarily on 67 thermo-luminescent monitoring dosimeters placed at specific onsite and offsite locations before (20) and after (47) the mishap. In addition, helicopter surveys (with Geiger-Mueller Counters) of the gamma and beta radiation in the airborne discharges from the plume, ground vehicle surveys, and gamma spectrum analyses of environmental soil, vegatation, surface water, and air samples, were made. Estimates of natural background (cosmic, terrestrial, and internal) radiation levels in the US also were considered.

The report, therefore, addresses several areas of concern: (1) the cumulative radiation exposure at strategic locations, (2) the types of radionuclides released, (3) the contribution to population exposure due to beta radiation emitted from the released radionuclides, and (4) the range of health effects that may result from the estimated collective dose.

This Ad Hoc Group concluded that the offsite collective dose associated with radioactive material released during the period of March 28 to April 7, 1979, represents minimal risks of additional health effects to the offsite 50-mile radius population. This total collective population dose averages 3,300 person-rem, or an average dose to an individual in this population of 1.5 millirem. It is of interest to note that the skin dose from a chest x-ray is 150 millirem. Also of interest is the fact that this additional amount of radiation is comparable to the amount of background radiation from the earth, sun, and other natural sources that the population of the northeastern United States is exposed to in about ten days.

The report also points out that, according to the American Cancer Society, had the incident not occurred, about 325,000 fatal cancers would have been projected for the population of two million over their remaining lifetimes.[4] Approximately 0.7 additional fatal cancers, as a result of the incident, is the projected occurrence.

It should be pointed out also that the radioactive iodine detected in milk samples during the period from March 31 through April 4 was 3000 times lower, at its maximum concentration, than the level at which the Food and Drug Administration would recommend that cows be removed from contaminated pasture.[4] Of significant importance is the conclusion that if the total potential health impact of the nuclear accident is compared with the estimated lifetime natural risk of these effects (should they occur) the differences would not be discernible.

As we approach the end of the century, intelligent forecasts project hard times. World overpopulation, insufficient energy, and a declining supply of coal, peat, oil, and other fossil fuels have been predicted. These all impose, if not demand, continued development of, and greater reliance on, nuclear energy.

Thirteen percent of the electricity produced in the US is generated by 70 nuclear power plants. Ninety-two permits to construct new reactors have been granted and approximately 34 reactors are on order or have been issued limited work authorizations. Inasmuch as there are risks, disaster, setbacks, and complications associated with all methods of electricity generation, and since the lesson to be learned from the Three Mile Island Nuclear Station mishap is the exercise of comprehensive, overall operational safety, it is apparent that continued concentration on safe, reliable nuclear energy production is a top priority of this nation--with no room for hysteria.

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(Editor's Note: Dr. Leslie L. Alexander is Chairman of the Environmental Health Committee of the Medical Society of the County of Kings, N.Y.)

Popular Magazine

"Babies Can Communicate at Birth," *The National Observer*, 1971.

Patrick Young

If they still burned heretics, Colwyn Trevarthen might find himself put to the torch by some irate psychologists. Trevarthen, you see, argues that babies are born far smarter than psychologists have given them credit for—that infants come into the world with a good deal of innate intelligence, including an embryonic form of speech.

"The ability of babies to communicate, using speech and gestures, is present at birth," he says. "There is a compulsion at birth to communicate." And that idea runs counter to the long-cherished notion that infants require months of tutoring before they can communicate at all with adults.

Trevarthen, a New Zealand-born biologist with an intense interest in the infant brain, grounds his theory on experiments he began at Harvard University in 1967 and resumed more recently at the University of Edinburgh in Scotland. His technique is simple; his results are intriguing; his extrapolations from his research are controversial. For example:

"I think culture and technology are innate in origin. There is no doubt man's mastery of the world is in his ability to co-operate and share knowledge. And this is not a discovery of man; it's part of his nature."

'It Didn't Make Sense'

Trevarthen began his studies confronted by two somewhat conflicting views of the brain, the biological and the psychological. The brain is an elaborate, if incomplete, structure at birth, containing all the nerve cells it will have throughout life. Over decades these cells mature and make interconnections in ways still not fathomed.

For decades psychologists emphasized the role of experience in intellectual development. They tended to view the brain as plastic and impressionable, and the development of language and communication as shaped almost exclusively by the baby's environment and experiences.

Granting the brain is far from fully developed at birth, Trevarthen was puzzled by the general view of psychologists in 1967 that a newborn's brain was almost totally incapable of perceiving and understanding the world around it and that any communication between baby and adults required months to develop.

"It didn't make sense from a biological point of view," he explained during a visit at the California Institute of Technology here. "Darwin's notion of human intelligence was that the fundamental features were innate and the human mind already endowed with complex processes."

'Talk' at 2 Months

Trevarthen favored a view—now winning larger acceptance—that much human behavior is innate and exists in embryonic form at birth. He set out to test his idea, to see if early signs of communication could be detected in infants. The result: "Newborn human beings show, in rudimentary form, many of the remarkable behaviors of adult intelligence, including a form of speech as a means of communication."

Trevarthen's procedure is to take hours and hours of movies of a baby and its mother. The child sits in an infant seat with its arms and legs free to move. The mother sits nearby so she can touch and talk to her baby. She is given no instructions except to chat with the child, a very natural thing for her to do. A mirror allows the camera to record the facial expressions of both.

Later the film is analyzed, often frame by frame, to see how the baby reacted. Trevarthen's aim is not to see how well an infant solves various problems at various ages—a standard test among psychologists—but rather to see how a child behaves and develops on its own.

"The films tell us what the baby chooses to do," Trevarthen says. He and his colleagues have now studied more than 200 children, many of them at weekly sessions throughout the first year of the child's life.

At Harvard, Trevarthen, Martin Richards, and Berry Brazelton quickly found that at 2 months infants know the difference between people and objects and that they make deliberate attempts to converse with their mothers and other adults. "This was a big discovery," Trevarthen says, noting that such behavior wasn't thought to occur until months later. "It meant that 2-month-old babies treated people as worth talking to. We found a 2-month-old is already equipped with the outline of speech and gestures."

Patterns of 'Prespeech'

Trevarthen has greatly expanded his studies of infant speech and gestures since joining the Edinburgh faculty in 1971. "Our studies show complex, conversationlike exchanges between mothers and infants when the latter are only a few weeks old," he says.

All the gooing, cooing, and mouthing movements infants offer adults apparently underlie language development. At 2 months, Trevarthen detects in infants what he calls "prespeech," a distinct pattern of elaborate lip and mouth movements that resemble the movements of adult speech. The baby may or may not make sounds in prespeech, but a specific breathing pattern is seen.

Prespeech is observed during "conversations" between mother and child. Mothers of 2-month-old infants, apparently unconsciously, adjust the pace of their talk to allow the baby to join in. The mother speaks, pauses, listens to her baby, and speaks again after letting the infant have his say. There is the rhythm of adult conversation,

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if not the substance.

"The mother is drawing the child out," Trevarthen says. "She asks questions and shows quite clearly on her face that she's expecting an answer. Her eyebrows shoot up and her eyes go wide. The mother acts in a stimulating way, and the baby gets excited and responds."

Trevarthen also finds early signs of prespeech, though far less developed, in newborns and in premature babies within a week after their birth. He regards this as evidence that infants are born with a natural drive toward speaking and that man's language ability is present in some form at birth. But language development, he agrees, definitely depends on each child's life experiences. "Environment is a tremendous voice," Trevarthen says.

Stimulus for Growth

He finds no evidence to support the fears voiced by some psychologists that talking "baby talk" to infants retards their linguistic growth or their development as persons. "Absolutely nothing that enters into communicating with the child can be bad for the child, unless it is carried to the point of dominating or smothering the child," Trevarthen says.

Infants use more than prespeech in attempting to communicate with adults. They also use a variety of hand movements. These parallel the animated gesturings of many adults during conversation. The beginnings of hand communication can be detected in the first month of life. "The shape of a hand—pincer, cave—exists at 3 weeks and is existing at 8 weeks," Trevarthen says.

Week-old babies will try to grasp tiny objects. At a month, Trevarthen finds, efforts to handle objects are accompanied by mouth and tongue movements and facial expressions similar to those adults use. He even finds these infants sometimes make a grimace when they drop something, as if to say "Oops."

"It may be a sign that even this early in life infants are ready to pass comment on their acts to other people," Trevarthen says.

A sharing of embryonic communications with the mother provides the baby with stimulus for intellectual growth, Trevarthen suggests. "I think this paves the way for language development and intellectual reasoning. Though the acts are hard to measure, they are perceived by the mother and reacts to them subconsciously. The fact she does react means her behavior turns into a kind of support for what the baby is doing. She provides the support, and then the baby discovers a lot of things it cannot discover on its own."

Trevarthen's team finds that prespeech occurs in both boys and girls to the same extent, but its expression varies by sex. Boys are more aggressive in communication, often using vigorous body movements and more frequently taking the initiative. Girls tend to be more co-operative and steady in conversation and to use gentle hand motions.

"In the balance between people and objects, we find female babies are more interested in personal communication and male babies show more active interest in objects," says Trevarthen. "It looks like the tendency of women to be concerned more with personal relationships has a strong biological basis, and that men depend on this.

"The way things occur, we don't very much think the differences are due to the attitudes of the mother to the baby. We don't think they're caused by the mother or the fact that she is female. I'm saying nothing about the relative quantity of intelligence at all. I'm talking about possible biological adaptations that make males and females different."

Trevarthen, a bit to his surprise, found that infants under 6 months rarely imitate their mothers. "It's a mistake to assume that because the mother helps the baby, the baby is imitating her," he says. "Frequently the mother is imitating the baby." This imitation apparently plays a vital part in encouraging the baby to increase its conversational activity. "You're showing you can do what he can do," says Trevarthen.

Baby Teaches Mother

A distinct change in infant-mother communication begins toward the end of the baby's third month of life. Trevarthen finds it recorded in film after film: The baby becomes rude to its mother.

When the mother begins speaking, the baby turns away, often looking at some toy or object, and refuses to meet the mother increasingly then lapses into finally she picks up a toy, usually the one the baby is looking at, and tries to interest the child in it. Then the baby responds. "It's a complicated process," Trevarthen says. "It seems to take two to three months of progressive steps to develop."

Trevarthen hazards an explanation of what this observation might mean—an explanation guaranteed to raise eyebrows. "What we believe happens is the baby introduces the mother to the idea their communication can involve objects," he says. "The baby says, 'We've got to stop this chat and find something to chat about.'"

"The mother is being trained by the baby. Having established a relationship, the baby transforms it and teaches the mother to be a teacher. And we learn that as a general prototype for all education. I think children invented school."

Trevarthen's research has provided major new insights into the linguistic and behavioral abilities of infants. His work has helped change the old view that the brains of infants are like soft plastic, ready to be molded solely by their experiences. But he acknowledges that his interpretations of some of his findings have yet to win total acceptance. "The psychologists," he says, "are still skeptical."

Popular Magazine

"Health Update." *Better Homes and Gardens,* June 1982.

HEALTH UPDATE

AVOIDING MOTION SICKNESS

If you're susceptible to motion sickness, here's good news. An old and effective drug—scopolamine—now is available in a new easy-to-use form.

The drug is packaged inside a dime-sized disk that you apply to the hairless area just behind your ear.

You apply the self-adhering disk about four hours before beginning an activity that can cause motion sickness. The drug is released at a steady rate for as long as three days. You can shower or swim while wearing the disk, and you can remove it at any time.

Transderm-V is the name of the product, and the manufacturer is CIBA Pharmaceutical Company. The drug is available by prescription and is intended for use by adults only. It costs about 75 cents per day.

The most common side effects of the drug are dryness in the mouth and drowsiness; you should keep the latter in mind if you drive a car or operate heavy machinery while taking the drug. Fortunately, drivers seldom suffer from motion sickness because their attention is focused on driving.

Here are some further tips for avoiding motion sickness.

- When flying, ask for a seat in the center of the plane.
- Sit up front in a car or on the deck of a boat, and fix your eyes on the horizon.
- Eat lightly—about two hours before departure.
- En route, try word games or engage in other activities that demand concentration (except reading, which may increase your discomfort).

BETTER TREATMENT FOR INSECT STINGS

One in every 100 people, or about one million Americans, is allergic to insect stings. For some of these people, the stings can be fatal.

If you've ever been stung and suffered more than the usual pain, redness, swelling, and itching at the site of the sting, you may be a candidate for immunization. Symptoms that may indicate an allergy to insect stings include difficulty in breathing, extensive swelling, hives, and dizziness.

Until recent years, allergists desensitized patients only by using extracts of the whole bodies of insects (known as WBE).

Now, treatment with venom from the insect to which you are allergic is the only protective treatment recommended by almost all allergists, say scientists at Johns Hopkins University. The venom therapy is safe and is effective within a few weeks, according to the results of a recent study.

Of 250 patients who received WBE for at least six months, 1f5 suffered later stings and two-thirds developed allergic reactions throughout the body.

Of 3,000 patients treated with venom at medical centers around the nation, under 3 percent have developed such reactions.

Despite the results of such studies, WBE still is being used by some allergists. Dr. David Golden and his colleagues at Johns Hopkins reported in the *Journal of the American Medical Association* that WBE may appear to work sometimes because a few patients recover from the allergy spontaneously.

With the venom therapy, patients build up the immunity to insect stings after receiving a six-week series of injections. Maintenance doses of the venom are required to sustain the level of immunity.

PREVENTING HEART ATTACKS

As many as 800,000 Americans are likely to have a heart attack this year. For the 350,000 who will survive, the goal is to prevent another, possibly fatal, attack.

Several preventive drugs are being used by such patients. Some of the drugs increase blood flow so that more oxygen reaches the heart muscle. Others lower blood pressure so that the heart does not have to work as hard.

The beta blockers such as propranolol have been hailed as one of the most dramatic drug "success stories" in recent years. These drugs block the action of certain nerves that stimulate the heart and blood vessels. As a result, the drugs help ensure that the heart continues to beat regularly.

Dr. William Friedewald of the National Heart, Lung, and Blood Institute estimates that three out of four heart attack survivors are eligible for treatment with beta blockers. (The remainder have other medical conditions, such as low blood pressure or congestive heart failure, which the drug could aggravate.)

Further research is needed to determine how long treatment with beta blockers should be continued and whether the drugs will benefit other patients who had heart attacks months or years previously.

Beta blockers have been used for many years to treat high blood pressure and chest pain associated with angina. Aside from propranolol, four other beta-blocking drugs have been approved for use in the United States. They are metoprolol, nadolol, atenolol, and timolol (the latter was approved specifically to reduce the risk of death from recurrent heart attacks).

Popular Magazine

"Rx for Water Pollution: Horseradish." *Technology Illustrated,* May 1982.

INNOVATIONS

Rx for Water Pollution: Horseradish

Armed with a plastic bag of horseradish roots and a bottle of hydrogen peroxide, a professor at the Massachusetts Institute of Technology set out to purify polluted wastewater from a local company that produces flame retardants. He minced the horseradish in a blender, stirred in water, and pressed the mixture through cheesecloth. Then he poured the juice and peroxide into a glass jar containing the murky water. A few hours later, the liquid turned clear.

Professor Alexander M. Klibanov began investigating this novel cleanup method in 1980. It works better than many traditional techniques, which are more expensive and often produce dangerous by-products that require special treatment. His method removes a wide variety of pollutants and results in a product that can be disposed of by burning. It works equally well whether you use purified peroxidase (an enzyme found in horseradish as well as in microorganisms and other plants) or horseradish roots, which can be bought in the supermarket and processed in a blender.

When Klibanov first experimented with the technique, in 12 out of the 40 polluted liquids tested, the treatment removed 99 percent of the phenols and aromatic amines—two families of extremely toxic and often mutagenic compounds common in industrial wastewater. The hydrogen peroxide and peroxidase added to the polluted liquids cause chemical reactions that produce free radicals—fragments of molecules that are unstable and must continue reacting to become stable. These fragments attach themselves to intact phenol molecules, making them unstable, and the process continues until a long chain of phenol molecules forms. Finally, the chain encounters another free radical or something else in the solution—a grain of sand, for example—that makes it stable. By this time, the chain molecule has grown so large that it no longer dissolves in water. It settles out of the solution and forms a sediment that can be removed easily.

The remaining 28 compounds tested were relatively unaffected by the treatment until they were mixed with one of the responsive compounds. In some cases the amount of pollutants removed rose from near zero to 99 percent. Although some pollutants by themselves remain dissolved in the solution, when mixed with ones that are easy to remove, they get caught in the chain reactions. Thus the large molecules that precipitate out of the solution contain both types of pollutants.

—Nancy W. Stauffer

Popular Magazine

"No-Cal Sugar." *Science '81*, July/August 1981.

No-cal sugar

WASHINGTON — The latest weapon in the war on fat tastes like sugar, bakes like sugar, and even has the same molecular formula as sugar. Its delightful distinction is that it can't turn into unwanted pounds.

So claims the promoter of "left-handed sugar," a no-calorie sweetener that comes straight from Lewis Carroll's looking-glass world (p. 37) Like most molecules, sugar can have two forms that are structurally identical but mirror images of each other, like left- and right-handed gloves. Humans can only digest right-handed sugar, which is the type found in virtually all plants and animals. Left-handed sugar has always been a rarity, a laboratory curiosity that was thought to have a bitter taste.

Gilbert Levin recently discovered otherwise. As a bioengineer in charge of a NASA experiment testing for life on Mars, he considered the possibility that Martian life had adapted to mirror images of earthly chemicals. Intrigued by such substances, he went on to test left-handed sugar. To his surprise, he found it was sweet—the bitter taste noted earlier had come from impurities mixed in with the sugar.

Because digestive enzymes are shaped to fit right-handed sugar, the left-handed sugar passes through the body intact. Levin says that it's also unaffected by bacteria and therefore doesn't spoil or cause tooth decay. Unlike other sugar substitutes, he says, the left-handed molecule browns while baking and leaves no aftertaste. Levin patented the use of the substance this year and hopes to see it put in soft drinks, foods, and drugs.

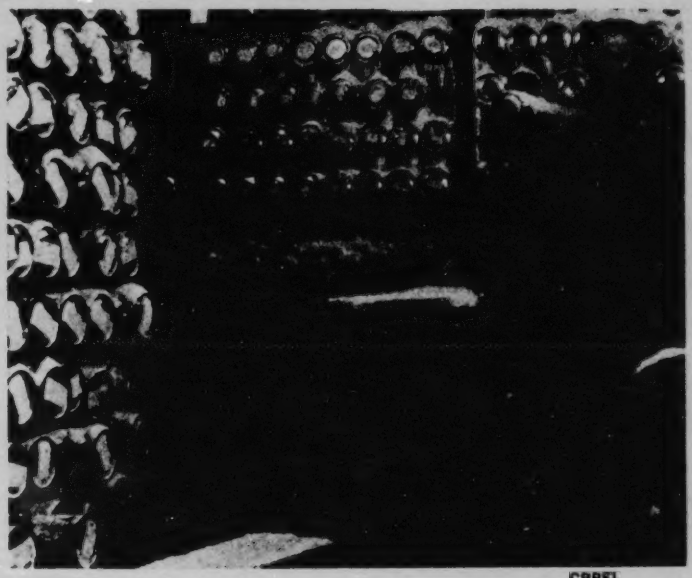
It will be some time before no-cal sugar reaches the grocery shelf, however. Although left-handed sugar is expected to pass the Food and Drug Administration's rigorous testing, as yet there is no economical method of mass producing it. Levin hopes that genetic engineering will yield a technique within several years.

Popular Magazine

"Ice Cores—Clues to Past Climates." *Science News*, 7 November 1970.

Ice cores: Clues to past climates

Variations in the isotopic composition of glacier ice cores provide valuable clues to the earth's climatic history



CRREL

Langway removes an ice core from CRREL *refrigerator.*

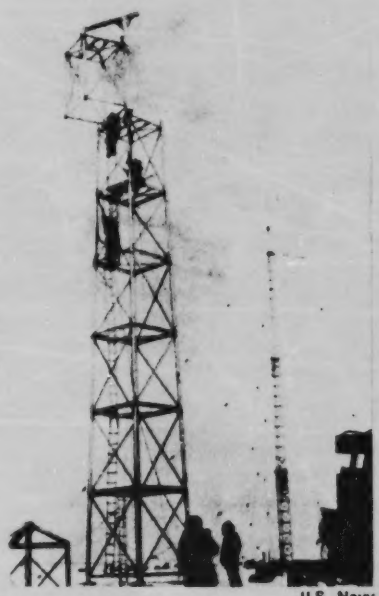
by Louise Purrett

To most persons glaciers symbolize just one kind of climate—cold. But to glaciologists they represent a comprehensive record of the whole range of past climate.

These scientists find clues to the earth's climatic history in the isotopic composition of the ice—the proportion of water molecules containing the heavy isotope of oxygen, O-18. This isotope is present in the atmosphere in concentrations that vary with temperature. The higher the temperature, the higher the concentration. When a cloud forms, its water molecules are synthesized out of the oxygen atoms in the surrounding atmosphere, and so will contain the heavy isotope in the same proportion. Then, because the molecules with O-18 are heavier than those with the more common O-16, they precipitate first. The relative concentrations of the two isotopes in an ice sample, therefore, indirectly tell scientists the atmospheric temperature at the time the ice was formed. The age of the ice sample can then be calculated from its depth within the glacier.

Samples of glacier ice are obtained in the same way as samples of ocean sediments—by extraction of cores. In 1966, the U.S. Army Cold Region Research and Engineering Laboratory, using a modified oil-drilling rig, penetrated through the entire thickness of the North Greenland ice sheet to obtain an ice core 1,390 meters long. Analysis of the isotopic concentrations at different levels in this core has provided a climatic record spanning 100,000 years.

This core is probably the most thoroughly studied chunk of ice in existence. Glaciologists from all over the world have requested samples. Among those who have examined it are Dr. Chester C. Langway of the CRREL and four Danish colleagues, Drs. S. J. Johnsen, Willi Dansgaard, H. B. Clausen and J. Møller, who have analyzed its isotopic variations over the 100,000-year extent of the core and determined in detail the climatic changes they represent. These researchers conclude that though the complete curve is valid primarily for the North Greenland area, it agrees with known and reported climatic changes in other parts of the world and with previous research using other methods.



U.S. Navy

Engineers erect Antarctic coring rig.

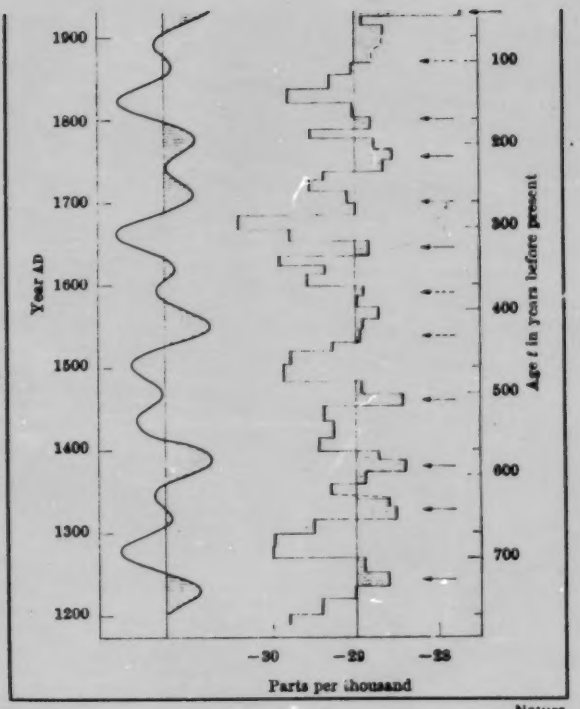
It shows, for instance, the well-known climatic optimum about A.D. 1930 and the Little Ice Age of 1600 to 1730. At about 10,000 years ago, the isotopic concentrations fall off rapidly, corresponding to the final stages of the last glaciation. Two peaks at 11,900 to 11,100 and 12,500 to 12,100 years ago coincide with the Alleroed and Boelling interstadials—halts in the movement of a glacier—that are well-known from European climatic records. This was the first suggestion of the occurrence of these interstadials in the Western Hemisphere. The scientists also discovered a low of long duration in the 15th century, which they feel might help explain the mysterious abandonment of the Norse settlements in Greenland.

During the last 1,000 or 1,400 years, the scientists note, there is an apparent oscillation in the isotopic concentrations with a period of about 120 years. The prime cause of the oscillations, they surmise, is probably related to fluctuations in solar radiation, since solar variations are also considered to cause changes in carbon 14 concentrations in the atmosphere, and five C-14 minima noted during the last thousand years correspond to maxima in the oxygen isotopic profile.

In a report in the Aug. 1 NATURE, Langway, Dansgaard, Johnsen and Clausen examine (in greater detail) the isotopic changes over the period from A.D. 1200 to 2000. Again they note the agreement with other studies of ancient climatic variations. For instance there

CRREL

Antarctic core taken from a depth of 2,000 meters.



Nature

Greenland core's O-18 values give temperature trends.

appear 10 maxima between A.D. 1240 and 1930 at intervals of about 63 years, which correspond to a 66-year climatic oscillation previously found from studies of Greenland fauna.

However, their graph is complicated by a number of accidental deviations that do not occur regularly. In order to eliminate these and simplify the curve into dominant trends, the scientists applied a Fourier analysis, a technique for reducing a complex curve into its basic components. Their analysis neglects long-range and short-term trends, such as the 11-year sunspot period, revealing only the trends of medium recurrence, but the resulting curve displays two dominant peaks at periods of 78 and 181 years. The 78-year period had been noticed before as oscillations in the length of the sunspot cycle. Relatively long intervals with short sunspot cycles occur at A.D. 1560 to 1590, 1750 to 1790 and 1900 to 1930. These intervals coincide with the three last maxima in the 181-year cycle on the curve. These two cycles, the scientists conclude, seem to originate from changing conditions on the sun.

By extrapolating the smoothed curve, the scientists were able to predict the probable climatic trend for the next 50 years. The gradual decline in temperatures that has been in progress for the last three decades (SN: 11/15/69, p. 458) should continue for the next 10 or 20 years, followed by an increase toward a maximum between A.D. 2010 and 2020. This future curve, they caution, will be influenced by accidental events and possibly by pollution of the atmosphere.

The studies on the Greenland core were so profitable that in 1968 the technique was tried at the other end of the earth. A new ice core was taken near Byrd Station in Antarctica, using the same drilling technique as was used in Greenland. This core, a much longer one, 2,164 meters, was sufficiently revealing, says Dr. Langway, to justify a full-scale Antarctic coring project. Accordingly, a National Academy of Sciences ad hoc group was convened to make recommendations for a project to drill through the Ross Ice Shelf. The plan was presented in August of this year at the 11th Scientific Committee on Antarctic Research (SCAR) meetings in Oslo, and SCAR president Gordon Robin of the Scott Polar Institute in Cambridge, England, has appointed a permanent committee, headed by Dr. James H. Zumberge of the University of Arizona. The committee, says Dr. Zumberge, will serve as an advisory body not only for the Ross Shelf project but also for any future drilling by the 12 member nations of SCAR.

The Ross Shelf project is still in the planning stage, but it is expected to break ice with a pilot hole in the Austral summer of 1971-72. Three research holes are planned: one to study the water under the shelf, which is inaccessible to modern submersibles and remote sensing devices; one to pass through both shelf and water into the ocean bottom to provide samples of sediments that have fallen off the base of the shelf, and one for glaciologists, which would penetrate only partially into the shelf. Dr. Langway, a member of the permanent committee, will be deeply involved in this third phase.

Dr. Langway believes that the ice core method of studying past climates has a spectacular future. Ice cores, he says, provide information unobtainable elsewhere. They give more detail than any other method, even to the point of showing seasonal variations. Further, since the stable isotope method is independent of radioactive decay, the climatic record contained in glaciers endures as long as the glacier itself, and cores from some dry-snow zones can provide continuous records spanning several hundred thousand years. □

'Killer Bees' Approaching U.S. Revive Crop Fears

By BAYARD WEBSTER

THE so-called killer bee is continuing to move north from South America and scientists are worrying about it again. They fear the bee's arrival in the United States, expected perhaps as early as 1988, may disrupt the nation's agriculture and beekeeping industries.

The "killer bee," or Africanized bee, a descendant of African queen bees that were accidentally set free in Brazil in 1957 and started mixing with local bee populations, has long been the subject of much speculation, myth and fear. Its venom is no more toxic than that of other honeybees and less so than that of some wasps, such as the yellow jackets and other hornets.

Although it is not destructive or vicious by nature and is harmless in its visits to backyard flower gardens, the Africanized bee more fiercely defends its hive or nest when disturbed than does the familiar European honeybee.

Fears about the Africanized bee had centered on this trait, but they diminished because of the possibility it would hybridize as it encountered the relatively gentle European bees and mated with them. In reality, although the African bee strain has been

Stephen Dalton/National Audubon Society/Photo Researchers

The European bee in the United States may be threatened by the aggressive Africanized bee.

in South America for 25 years, the African characteristics have predominated, Orley R. [illegible], entomologist at the University of [illegible] found.

And because of the Africanized [illegible] propensity, unpredictable behavior [illegible] ency to invade and supersede the [illegible] pean bees it encounters, major changes [illegible] tice of beekeeping in the Southern states [illegible] bly elsewhere, may have to be made if the [illegible] becomes predominant, scientists say.

American farmers and beekeepers now [illegible] solely on the easily managed European honeybee, for crop pollination and honey and wax production.

Honey production is a $15[illegible] million industry and the Department of Agriculture estimates that honeybees pollinate about $5 billion worth of food crops, including all of America's apples, [illegible] cucumbers, cherries and alfalfa [illegible] many other fruit and vegetable crops.

The Africanized bee also swarms [illegible] quently than the European bee, and [illegible] temporarily slows a hive's honey production. Africanized bees habitually abscond [illegible] when the flowering plant nectar flow [illegible]

Continued on Page C2

Newspaper

"'Killer Bees' Approaching U.S. Revive Crop Fears," *New York Times*, 18 July 1982.

Killer Bees' Near U.S., Reviving Crop Fears

Continued From Page C1

slightly, or when the hive becomes too small for the colony's population.

Early observations of the bee in South America seemed to show that the African bee was a better honey producer than the European bee, that it readily hybridized with native bees and that mixing with native stock was making it less feral and easier to manage as it migrated northward. But the most recent scientific investigations indicate otherwise.

In an interview Dr. Taylor, who has studied the Africanized bees for many years, said a difference in mating patterns was one reason the present-day bees that moved northward do not differ significantly from the pure African bee, Apis melifera adansonii. In areas colonized by both bees, studies of the peak flying times of African and European virgin queens show that when the European queens are most numerous on their mating flights, the Africanized male drone bees are themselves most numerous. The result is that there are more African/European matings than European/European bee matings.

Dr. Taylor's data also showed that African drones mated with both European and African queens, but the European drones tended to mate only with European queens. As a result, over several generations an area's population of European bees tended to become Africanized. And bees resulting from crosses between the two strains seemed to retain the behavioral characteristics of the African species in succeeding generations.

David Roubik, a biologist at the Smithsonian Tropical Research Institute in Panama, has found that the Africanized bees were not, after all, good honey producers. Among the reasons, he believes, is that the tropical bee, accustomed to a constant year-round nectar flow from everblooming tropical flora, does not have to amass huge honey stores to tide it over the winter months as the European bee, a temperate-zone insect, must do.

In Venezuela, Dr. Thomas Rinderer and Dr. Anita Collins of the Agriculture Department's Bee Breeding Laboratory in Baton Rouge, La., found that the Africanized bees produced less honey because they used more brood cells in which to raise their young and fewer for honey storage than the European bee. This caused the hive population to expand rapidly and resulted in more frequent swarming. "The implication here is that in the United States the Africanized bee will be a lousy honey producer," Dr. Collins said.

The African bee made its first appearance on this continent in 1957 when it was accidentally introduced in São Paulo, Brazil. More than two dozen queen bees imported from Africa for scientific breeding experiments escaped. Although slightly smaller in size than its close relative, the European honeybee, the Africanized bee closely resembles the European bee in shape and color. But there the resemblance stops.

According to Dr. Collins the most noticeable difference between the two species is that the Africanized bees are "much more excitable." A knock on a hive, she said, can provoke them to sting the nearest outside object with such ferocity that about 10 times more bees will sacrifice their stingers and lives than if they were European bees similarly disturbed. The Africanized bees will also pursue fleeing intruders for longer distances than other honeybee species will. And they will stay agitated for several days after an intrusion, while European bees quickly recover their calm.

Entomologists believe that the tropical bee's unusual mass-stinging behavior also involves quicker communication of alarms within and between colonies than European bees can manage.

Other distinctive characteristics of the Africanized bees noted by scientists include their shorter tongues, the slightly smaller size of the cells they build in their hives, and the fact that they nest in the wild much more than do European honeybees.

The Africanized bee has expanded

The New York Times / July 13, 1988

The northward spread of the Africanized bee began in 1957 and is expected to reach its limit between 1988 and 1994.

its population in all directions from São Paulo at the rate of about 200 miles a year. Several months ago, Dr. Roubik found a few colonies in Panama, the northern limit of expansion so far. There are now about 200 colonies in that country.

Dr. Taylor, who has accurately predicted the bee's northward progress for the past decade, expects them to enter the southern United States shortly after they arrive in northern Mexico in 1988.

Dr. Taylor estimates that the Africanized bees will not survive where there are fewer than 240 frost-free days a year. Thus the northern limits of such an area in the United States would extend in a wiggly line from San Francisco through the southern tier of states and up to Fayetteville, N.C. Dr. Taylor said that a less specific northern limit could be defined by the 34th parallel of north latitude, which passes through Columbia, S.C., and just north of Athens, Ga.

Although the Africanized bee is not expected to be able to survive in higher latitudes, scientists point out that it could have a nationwide impact nevertheless. Most commercial bee-raising and queen-rearing operations are based in Southern states. Bees from these states are shipped to farmers farther north for crop pollination and to apiaries and individuals in the United States and Canada for honey production. If bees in the American South become Africanized, the area's apiculture business stands to be gravely damaged or moved northwards.

Bee experts note that little research has been done on the pollination capabilities of the Africanized bee, so that scientists do not know what the impact on United States agriculture will be if the Africanized honeybee takes over.

In some South American countries where the Africanized honeybee has become established, honey production has fallen off drastically and many beekeepers have quit because of the added difficulty and expense of managing the bees.

Some of the changes required have included more extensive safety precautions, such as placing the hives several hundred feet from the nearest human habitation.

To manage the bees efficiently, beekeepers have found placing the hives further apart helps to keep them from raiding each other's stocks, while providing more room in hives helps prevent swarming or absconding. But how they may behave and perform in the United States where the habitat, climate and temperature are different from South America, is an unanswered question.

Newspaper

"Low Calcium Tied to High Blood Pressure," *New York Times*, 13 July 1982.

Low Calcium Tied to High Blood Pressure

Too little calcium in the diet may be a hitherto unrecognized factor contributing to high blood pressure, according to a study done at the Oregon Health Sciences University in Portland.

The study, based on a survey of the dietary habits of a group of 90 adults, found the 46 persons who had high blood pressure had consumed significantly less calcium than the 44 with normal blood pressure, said a report of the study published in the July 16 issue of the journal Science.

Dairy foods, such as cheese and yogurt, are a primary source of calcium.

Dr. David A. McCarron, associate professor of medicine at the university, and chief author of the report, said he considered the calcium findings to be much more striking than earlier evidence linking salt to high blood pressure. It is widely believed that excess salt in the diet contributes to high blood pressure, but Dr. McCarron said it has been impossible to prove this on the basis of American dietary habits.

Dr. McCarron wrote the report with Cynthia D. Morris and Clarice Cole. All are on the staff of the school's Division of Nephrology and Hypertension.

The report noted that the trend in the United States in recent years has been toward reduced consumption of dairy products as Americans have lowered their intake of fats, cholesterol and salt, hoping to cut the risk of heart disease and perhaps cancer. However, the new study suggests that, for some people at least, the resulting loss of calcium may increase the risk of high blood pressure.

Newspaper

"The Cost of Research Dangers Finally Is Being Reckoned With." *New York Times*, February 18, 1979.

The Cost of Research Dangers Finally Is Being Reckoned With

By KAREN DE WITT

Each year several hundred thousand Americans, about 1 percent of the population, voluntarily become research subjects, allowing their bodies to be used to test everything from new cold medicines to experimental cancer treatments. Without such volunteers, medical science would collapse. Practically every drug, medical device and surgical procedure used today went through a clinical trial with human subjects. Increasingly, though, with the explosion in biomedical techniques and advances, there is growing concern about protecting human research subjects and compensating them for any injury incurred.

Last month, the Department of Health, Education and Welfare made it mandatory for research institutions to tell potential subjects, as part of obtaining informed consent, whether a compensatory mechanism is available to care for them if they are injured. The new rule has caused a controversy in the research community, raising not only medical questions but moral and ethical ones as well.

The regulation stems from recommendations of the National Commission for Protection of Human Subjects of Biomedical and Behavioral Research, created by Congress in 1974 after revelations of such glaring abuses as a long-term syphilis study, done on a group of low-income Alabama blacks, in which the disease was allowed to run its course even after the discovery that penicillin would cure it.

In most current instances, no such provision for compensation exists. The University of Washington and the University of California are exceptions, and several foreign countries, including Britain and Sweden, have compensation programs as part of their national health programs.

Few medical researchers object to the compensation concept, said Dr. Charles R. McCarthy, director of the Office of Protection from Research Risks of the National Institutes of Health. But many fear that until compensation mechanisms are created, telling a potential research subject that nothing exists to take care of him or her in case of injury will deter participation.

The new regulation raises other questions. Who should be responsible for compensation? The researcher? The institution? The Federal Government if it requested the research? Who should be compensated and for how long? What sort of compensation should be offered, for example, if a woman becomes pregnant after receiving a placebo during a study to determine whether the side effects of birth control pills are actual physical reactions or imaginary? Is the institution responsible for the support and nurturing of the children born as a result?

Malpractice law does not cover such cases because it is based on standard, accepted medical practices, not experimental procedures. H.E.W. officials are already at work on rules that would begin to clarify the situation by requiring research institutions to have compensation structures in operation.

Until then, however, the new regulation confers another area of responsibility on institutional review boards. H.E.W. has for many years required that such boards consider the risk to human subjects involved in biomedical research projects or psychological experiments in which participants are manipulated. There are hundreds of these bodies permanently functioning and thousands that operate for short terms. Such boards must now make sure that prospective subjects are told about the availability, or lack of it, of compensation mechanisms.

This new obligation comes when review boards are being criticized for failing to live up to their current responsibilities in biomedical research, while overstepping their bounds in the social sciences. For example, at the University of Washington a review board committee wished to prohibit social scientists from observing political demonstrations or court cases unless those observed consented. At another institution, a researcher planned to watch rehearsals at a Shakespeare festival to see if some actors regularly followed directors' suggestions while others did not, and whether one group got better reviews. The committee advised him that he would have to tell the actors first. Dr. McCarthy said that the Federal Government was still wrestling with this issue. "It really runs contrary to our definitions of private behavior. Being observed makes most of us feel uncomfortable, even if our actions are being done in public."

While officious review boards may irritate social scientists, a far more serious criticism, lodged by the Survey Research Center of the University of Michigan, holds that many review boards have failed to improve the basic human protective device, the consent forms that subjects must sign before they participate in a research project. The survey turned out that many such forms supplied insufficient information for prospective subjects and were difficult for the average person to understand. Further, of the 500 boards surveyed, only half had settled on even an informal procedure that would require scientists to tell subjects if they had been injured.

The Hastings Center, an organization founded in 1969 to investigate the ethical impact of the biological sciences, is starting a newsletter intended to educate review boards. Dr. Robert M. Veatch of the center said H.E.W.'s new regulation on compensation was an example of the increasing complexities the boards had to deal with. He said the newsletter would serve as a communication link to discuss case studies at various institutions, changing state and Federal regulations and court cases.

Fortunately for the human research subject, statistics show that it is rare for someone to be injured during a research project. Indeed, a recent survey of research subjects revealed that participants in medical research programs are actually less likely than the rest of the population to suffer untoward harm.

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Editorial. *American Opinion*, January 1982.

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Dear Reader:

Our cover painting is the latest of nearly two hundred commissioned by this magazine from the distinguished American artist Daniel Michael Canavan. It reminds us that January 22nd marks the ninth anniversary of the Supreme Court decision in the case of *Roe v. Wade*, which struck down anti-abortion statutes in all fifty states. The grisly result has been the killing by their own mothers of thirteen million children — more than eleven times the number of Americans who have died on the battlefields of all of our wars combined. Mr. Canavan calls his painting "The Unknown Child."

This month also marks the first anniversary of the Reagan Administration. Beginning on the next page you will find Gary Allen's review of its growing troubles. That in turn is followed by William Hoar's report on the efforts of environmental extremists to smear Interior Secretary James Watt. Indeed, so vicious is this hate campaign that it involves an attack on Watt's religious faith.

The radicals who hate religion, of course, are not above using it for their own purposes. Beginning on page nineteen, Alan Stang outlines some of the crimes of the World Council of Churches. Especially horrifying is his account of the butchery and rape of Christian missionaries by Communist terrorists financed by the W.C.C.

It is always an objective of criminal conspirators to cloak even their most foul deeds as acts of virtue and charity. Thus funds are raised for the support of Communist terrorists who murder missionaries in the name of fighting racism. Monies are collected by environmental extremists to smear the character and faith of an honorable public servant in the name of saving the whales or preserving the whooping crane. And, so that every living child might be loved, thirteen million American babies are killed at the convenience of their mothers. Indeed, as Robert Lee shows in his article beginning on page forty-five, even the charity of America as a nation has been manipulated to bleed us of $500 billion dollars in foreign-aid programs that have done little more than institutionalize poverty and dictatorship while opening the door to Communism.

It is simply incredible how effectively the best instincts of Americans have been harnessed to make possible our destruction. For instance, consider John Rees's report here on Public Broadcasting. Persuaded that television should offer ballet and Shakespeare and symphony to glorify our heritage and edify our people, Congress created the Public Broadcasting Corporation. The result was naked dancing, British soap opera, and news programming that often seems to come right out of the pages of *Pravda*.

One doesn't know whether to laugh or cry. Except there isn't time for either. With our fellow Americans beginning at last to awaken to the ways in which they have been so cruelly used, Conservatives must now lead or forfeit. The stakes are everything we love.

Sincerely,

Scott Stanley Jr.

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Affiliated Publication

excerpt from "How Your Taxes Go to Fund the Left." *American Opinion,* March 1982.

How Your Taxes Go To Fund THE LEFT

William P. Hoar *is a feature columnist and Associate Editor for* The Review Of The News, *the authoritative national Conservative newsmagazine. Mr. Hoar, who is a graduate of Bowdoin College, is a frequent contributor.*

■ LEGAL PLUNDER can be organized in an infinite number of ways, reflected the French statesman Frederic Bastiat in the mid-Nineteenth Century. For example, he said, these include "tariffs, protection, benefits, subsidies, encouragements, progressive taxation, public schools, guaranteed jobs, guaranteed profits, minimum wages, a right to relief, a right to the tools of labor, free credit, and so on, and so on. All these plans as a whole — with their common aim of legal plunder — constitute socialism."

It is just such a system that is today stealing our federal tax dollars for such projects as a survey "of cross-cultural folk traditions using folk puppets to promote internation-

MARCH, 1982

al understanding among diverse cultures of Africa and Asia." Perhaps Frederic Bastiat, who died in 1850, was better off not knowing how far "legal plunder" might go.

But we Americans, whose total earnings for at least five months of the year are taxed away to subsidize such balderdash and worse, must put an end to it. And that means defunding the Left by withdrawing federal subsidies. That is, unless we want to continue expenditure of tax dollars for such projects as a documentary film about Chicano youths in the Forties called *Pachuco Zoot-suiters*! We've already paid for that one, of course, thanks to the National Endowment for the Arts. Which means that some married couple, filing jointly with taxable income of forty thousand dollars, saw the federal government spend every cent of their income taxes on the aforementioned movie.

Doesn't that make you want to file an early tax return? After all, Uncle Sam needs your dollars today.

The Reaganite National Endowment for the Arts has also joined forces with a venture in Georgetown called the Pleasure Chest to present an "Erotic Art Show" at the Washington's Women's Art Center. As reviewed by the jaded *Washington Post* for January 30, 1982: This "woozy, womb-a-rama is a dull, defiant downer. Its chief imagery is vulvar. The feminist who juried it, Joan Semmel of New York, apparently believes that consciousness is raised by lowering the gaze . . . . The female sexual organ is portrayed, often vaguely, more than 50 times in this 35-item show."

And you, Mr. and Mrs. America, financed it.

These people *do* have a little trouble with their ideology. For instance, does this not work at cross-purposes to the thousands of tax dollars granted by the N.E.A. to the Feminist Radio Network to improve programs by, for, and about women? Or is it competitive with the Arts Endowment grant of your tax money to the San Francisco "literary magazine" called *Gay Sunshine*?

All of the above, and more, are part of the Left's federal subsidy. And it is just such destructive spending that makes Americans angry about Mr. Reagan's proposed federal Budget of more than $750 billion. Recall that it took the United States one hundred seventy-five years to acquire a Budget of $100 billion; but in the subsequent two decades that Budget has been increased sevenfold. As a French maximist once put it, it's "easier to make certain things legal than to make them legitimate."

But what can be done can also be undone — if enough public pressure is applied. Such pressure certainly is needed, because your federal taxes are now being spent to lobby for the squandering of even more tax money. Donald Lambro described this procedure in *Fat City: How Washington Wastes Your Taxes*:

"As more and more funding is becoming available through grants, contracts, and awards, many of these lobbying and advocacy groups are establishing tax-exempt *spin-off groups* or so-called educational and research conduits, through which federal funds are spent. So many private groups and associations are receiving federal funding of one type or another that it is not uncommon to hear federal officials ask, 'Do you know of anyone who *isn't* getting federal money?'

"An examination of government records reveals a seemingly endless list of these subsidized organizations. Many of them are well-staffed, financially well-heeled, and

Government channels millions of your tax dollars each year into such Leftist schemes as the socialist Campaign for Economic Democracy and the radical National Organization for Women. Your taxes have also gone to subsidize homosexual immigrants from Cuba and Medicaid payments for sex change operations.

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often deeply involved in political action, grass-roots organizing, and various public advocacy and legislative lobbying activities and causes. More important, there is substantial evidence that our tax dollars are often indirectly supporting the lobbying programs of many of these special-interest groups. This is occurring despite the fact that federal law clearly states that it is *illegal* for federal funds to be used 'directly or indirectly' to influence a member of Congress in his legislative duties." (South Bend, Indiana, Regnery/Gateway, 1980.)

Undoubtedly you'll be pleased to know as well that Mr. and Mrs. Hanoi Jane Fonda have been beneficiaries of your tax money through their Campaign for Economic Democracy, an out-and-out socialist political party.

"Under the Carter administration, for example," reported the February issue of *Reason* magazine, "$189,000 was granted to CED's Laurel Springs facility to train VISTA volunteers. (Laurel Springs is a 120-acre ranch north of Santa Barbara, California, bought by Fonda and [*Tom "We Are All Vietcong"*] Hayden in 1977 as a site for developing alternative energy sources and setting up a CED Organizer Training Institute and a summer camp.)

"CETA [*Comprehensive Education and Training Act*] money found its way to Santa Monica City Council member and now mayor Ruth Yannatta Goldway's Center for New Corporate Priorities. This openly political organization received a $126,000 grant that paid part of Ms. Goldway's own salary at the center and went toward placing 57 CETA trainees in community organization with varying connections to CED . . . .

"Department of Energy funds came under Tom Hayden's control when he was made director of a [*Department of Energy*] project in California. 'In addition to hiring CED cronies to work on Western SUN's staff,' reported the *Berkeley Barb*, 'Hayden and his allies have also been careful to see that federal funds from the program have been channeled, almost exclusively, into "community action" programs and groups affiliated with CED.' "

And while the Reagan Department of Education may yet be restructured, it has in the meantime been funding the radical Project on Equal Education Rights (P.E.E.R.) in its alleged attempt to create "a feminist model of a basic elementary textbook" where "Cro-Magnon man," for instance, is replaced by "Cro-Magnon people." According to *Human Events* for January 30, 1982:

Affiliated Publication

"Militarism and the Tradition of Radical Feminism." *Women—A Journal of Liberation*, Vol. 8 (1), December 1981.

MILITARISM and the TRADITION of RADICAL FEMINISM

by RENA GRASSO PATTERSON
BROOKLYN, NY

Is militarism a women's issue? Thinking about this question, I developed a hunger for history. I wondered how women during the 1930s experienced the decades between the world wars. Was the women's movement active? How did feminists view, and what actions did they take against, the impending war? My search for answers brought me to two books--Virginia Woolf's *Three Guineas* (1938) and Winifred Holtby's *Women and a Changing Civilization* (1935). These books present striking and disquieting parallels to our current predicaments.

Despite World War I, the thirties witnessed the emergence of dangers very much like what we are now facing. Both Woolf and Holtby provide us with a feminist perspective on the years of economic depression and rising fascism preceding World War II. In *Women and a Changing Civilization*, a friend of Holtby lectures:

> *There had been a rise of feminism; there is now a reaction against it. The pendulum is swinging backwards, not only against feminism, but against democracy, liberty, and reason, against international cooperation and political tolerance.*

Holtby describes the ideological campaign to take away the gains of feminism, how concepts and admonitions on women's proper sphere crept into public consciousness in the guise of objective study, the publication of novels depicting women suffering from their achievements, and the use of antifeminists as spokeswomen for reaction. In the thirties it was Ethel M. Deel who wrote and spoke widely of women as "neurotic masochists yearning for the strong hand of the master."

The subjugation of women was necessary to rebuilding and expanding capitalist patriarchy. In 1931 the Catholic Church played a key role by issuing a papal encyclical, "Casti Connobii." Marriage, it declared, was a sacred union, divorce a grave offense, the use of contraception sinful, and the subservience of women a divine mandate. Russia was modifying its liberal policy on abortion and contraception, and abortion in England was a crime punishable by from three years in jail to a life sentence.

In Germany after impressive achievements were made possible by the declaration of equality in 1918, women in the thirties were harshly pushed out of the economy. Concomitantly, Hitler, Mussolini, and countless ideologues extolled the sanctity of motherhood. Charges of lesbianism were leveled against any women bucking the conservative tide. Hitler had come to power with promises to restore Germany's prestige and its economic and military might, and to cure unemployment and inflation.

Can we prevent war? A gentleman poses this question to Virginia Woolf. *Three Guineas* is her answer--an analysis of male domination and her vision of an autonomous women's movement. Thus she responds to the question by

educating the man on Aurthur's Education Fund--since medieval times, women have been deprived of education while the sons of the educated receive all the money, liberties, and amenities necessary to establish and maintain male domination in every public sphere.

Woolf's analysis is not simply a harangue on inequality (though her lack of formal university education was a source of shame and bitterness for Woolf). The keystone of her thesis is that "the two classes (men and women) differ enormously." Yet this position is emphatically not biological or mystical, but firmly rooted in history and tradition. She argues that the social, educational, and economic conditions of men and women differ radically and that this history is "not without its effects on mind and body."

Having established this foundation, Woolf holds before her imaginary interlocutor a photo of dead bodies and ruined homes. She marks the horror and revulsion the photo excites and then asks that we consider the connections between this image and the differing social lives of men and women. She helps us draw this connection by invoking images and observations: an ermine-bedecked judge pontificating on women's vanity is offered for our scrutiny. Woolf asks us to consider male love of self-advertisement and male dress with its emphasis on degree, distinction, and status. Her conclusion is that the system of distinction and ceremony reflecting and legitimatizing male power is the emblem of an invidious system which rouses competition and jealousy--the attitudes and behavior which foster war and conflict.

At the pinnacle of the hierarchy, Woolf reveals its epitome:

> *It is the figure of a man; some say, others deny, that he is Man himself, the quintessence of virility, the perfect type of which all others are imperfect adumbrations. He is a man certainly. His eyes are glazed; his eyes glare. His body, which is braced in an unnatural position, is tightly cased in uniform. Upon the breast of that uniform are sewn several medals and mystic symbols. His hand is upon a sword. He is called in German and Italian Fuhrer and Duce; in our own language Tyrant or Dictator. And behind him lie ruined houses and dead bodies--men, women, and children.*

But the crux of her argument is yet to be developed. For the significance of this portrait only emerges with an understanding of male despotism at all societal levels and, most pervasively and insidiously, in the power of "fathers." Drawing examples from biography, Woolf recounts the grim histories

Miriam Greenwald, Merion Station, Pa.

of daughters tyrannized by fathers who keep them dependent and powerless. These family dictators, she asserts, derive their force from a society which supports private despots because they are essential to male domination.

All this is to deny her questioner and her readers the comfort of easy abstractions. He says he wants justice, freedom, and liberty, and to prevent war. Woolf replies that these can never be realized so long as patriarchy retains its hold on men and women. The battle against tyranny and destruction is the same battle that feminists have been waging since the nineteenth century. It is the battle against male domination, and Woolf insists it must be fought at home as well as abroad, in our intimate "private" lives as well as in the public arena: "Should we not crush him in

our own country before we ask her (Woman) to help us to crush him abroad?"

This realization leads to Woolf's articulation of feminist strategy. By virtue of women's oppression and deprivation, she argues, women have the potential to change the destructive and unjust nature of society. Women form a "Society of Outsiders," who must build upon their "outsiderness." She envisions not only an autonomous women's movement but a radical one; one that implicitly indicts liberal feminism: women must refuse all distinctions, honors, and degrees; they must become educated, even professionals, but never must they support practices which deny that education and profession to other races and classes. Women must refuse to make more money and gobble up more resources than they need to live a reasonable life.

At the heart of her argument and vision, Woolf places women's "Freedom from Unreal Loyalties" as the source of their revolutionary potential. The patriotism and nationalism which spur men to defend and fight for what has benefited them so much must not mean the same things for women. "As a woman I want no country. As a woman my country is the whole world," writes Woolf.

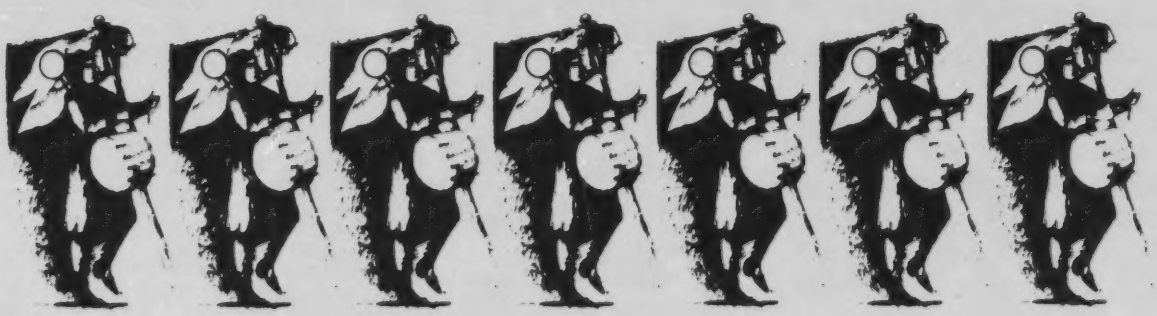
It is a profound and troubling answer which Virginia Woolf offers. To be effective, the Society of Outsiders must scrupulously live its politics. This seems an appropriate ideal but practically difficult to attain in a society which puts status and money at the core of self-worth. The task she sets is awesome. To prevent war is inseparable from creating a new society--one that transforms the fundamental relationships between individuals as well as between the institutions. The responsibility falls historically on women, who must preserve their special perspectives and strengthen their "outsiders" qualities in all women's groups. Thus she refuses to allow that women would join male protest societies:

> *For by so doing we should merge our identity in yours; follow . . . and score still deeper the old worn ruts in which society, like a gramophone whose needle is stuck, is grinding out with intolerable unanimity "Three Hundred Million spent upon arms."*

But what do we as feminists learn besides the remarkable parallels linking us with the thirties? The observations and convictions of Woolf and Holtby strengthen my own conviction that as women we must fight from the center of our oppression as women because it is inseparable from all the interacting oppressions and injustices. Holtby pondered the propensity of humankind to deny full humanity to differing social groups (women, blacks, Native Americans, the poor and working class). The trivialization and second-rate status accorded to women and concerns associated with women's spheres, and the concomitant valuation of masculine behavior is the source of destructive forces sweeping the world now as in the thirties:

> *The lack of interest displayed by public authorities in the creation and preservation of healthy human life compared with the provision of military defense against possible enemies--all these varying aspects of modern life arise from the same deeply-rooted conviction that women and their affairs are of less importance than men and their affairs. A modern state thinks it essential to have three full ministries--one each to organize military, naval and air destruction--but only one ministry of health, for preservation of life.*

A cardinal precept of radical feminism in the 1960s and 1970s was anticipated in Woolf's "answer" to the question of war: "The public and the private worlds are inseparably connected . . . the tyrannies and servilities of the one are the tyrannies and servilities of the other." To prevent war is to fight male power, to expose and defy the pretensions of masculinity, and to recognize and act against the basic principle operating in all domains of patriarchal-capitalist society. ■



Sensationalist Publication

"New Youth Serum Adds 20 Years to Your Life." *National Examiner*, 8 April 1981.

New youth serum adds 20 years to your life

AN AMAZING new hormone injection that can add up to 20 years to your life, has been discovered by top scientists in the U.S.

Thiscovered hormone — thymosin — works by boosting the body's immune system and making a senior citizen as capable of fighting disease as any healthy young adult.

What's more thymosin can keep alive those children who usually die at an early age because they were born without the ability to fight disease.

"We're very excited about our discovery," Dr. Allan Goldstein, of the George Washington University School of Medicine in Washington, D.C., told the Examiner. "It has great potential for prolonging life."

Miracle hormone fights disease restores health

Because so few children are born with the inability to fight disease, Dr. Goldstein says the biggest impact of the newly discovered hormone will be on the elderly.

"The discovery of thymosin could mean people will be a lot healthier in old age. Many won't have to deal with disabling diseases at all," said Dr. Goldstein. "And they'll live longer."

The possible life span of the human being is now considered to be about 110. Yet most people don't make it to that ripe old age.

"I'm not saying we'll be able to boost the lifespan beyond 110 years with thymosin, but we may be able to affect the average life expectancy," Dr. William Regelson, scientific director of the Fund for Integrative Biomedical Research (FIBER) told the Examiner.

"If thymosin is as successful as hoped, the average life expectancy could be 84 or 90 instead of the present 73."

The hormone thymosin was discovered by Dr. Goldstein and Dr. Abraham White when they worked together at the Albert Einstein School of Medicine in New York City.

The pair found that the thymosin-producing thymus gland, found under the breastbone, is the master gland which controls the immune system.

Everyone produces a lot of thymosin when they are young but as they age, the thymus is one of the first glands to self-destruct. This results in a very weak immune system in most elderly people.

With the first ill wind they succumb to disease and die or suffer for a long time.

However with injections of thymosin, the immune system would continue to operate at a high level even into old age.

It would be particularly effective helping the aged fight the most common killer diseases — cancer, rheumatoid arthritis and pneumonia and other infections.

Thymosin is usually extraced from the thymus gland in calves. However now it is being synthetically manufactured by Hoffman-LaRoche, the largest pharmaceutical company in the world.

Although it proved hugely successful in laboratory experiments on rats, so far it has only been tested a short time on adults.

A number of researchers believe science is on the verge of many discoveries that will increase the average lifetime.

But aging is a part of earthly existence.

SECTION II: STUDENT RESEARCH TOOLS

STUDENT RESEARCH TOOLS

Introduction

A plate of spaghetti might be very appealing to the eye, but to try to eat it without the benefit of a fork might prove frustrating and sloppy to say the least. Someone trying to use chop sticks for the first time can experience similar feelings. Indeed, students who face the task of writing a research paper face the same problems. They must be taught not only the research tools that are available, but the ways in which they can use these tools.

This section of the *Course Manual* is designed to help the teacher assess what his or her pupils actually know about research and what they need to learn in order to assist them in doing their research. When used in conjunction with the *Writing Manual*, "Student Research Tools" should give the teacher a valuable list of topics and activities to draw upon. The teacher is encouraged to choose the particular topics and activities that will be of most value to his or her class.

In organizing any unit on research papers, the teacher should use all available resources. The school library and local public and/or college libraries should be informed of the subjects to be researched well in advance. Arrangements can be made for class visits. The better informed the librarian is about the scope of the research project, the materials needed, the abilities and interests of the students, the better the librarian will be able to offer assistance. The teacher may, indeed, find it advantageous to examine the materials available in the local library and make suggestions to the librarian.

By teaching the students what resources are available and how they can use them, the teacher will help minimize most of the mystery, frustration, and time involved in the pupils' research. Through the study of the areas covered in this section, it is hoped the student will learn:

a. to use a variety of resources independently and to be able to explore different aspects of a subject;
b. to select subject headings and find information through these subjects in encyclopedia indices, the card catalog, and other special indices and reference works;

c. to understand the importance of bringing a subject up to date through periodicals and other current materials;

d. to extend basic research toward the exploration of individual materials and the resources of outside agencies;

e. to evaluate critically sources used, to organize the information gathered, and to present it clearly and accurately in the form required;

f. to use media center resources both in and out of school to satisfy the demands of his personal life and the demands of the community in which he lives;

g. to develop skills in locating and using in the most effective way a variety of available resource materials;

h. to develop skills and interest in investigating and searching for additional information to clarify, supplement and enrich his existing knowledge.

TOPIC I—DIAGNOSTIC RESEARCH TOOLS TEST

To determine how much background students have in using and understanding library reference materials, the teacher may choose to give the class the following DIAGNOSTIC RESEARCH TOOLS TEST.

This test is meant as a diagnostic tool to evaluate the specific needs of a class. Based on the results of this test the teacher can select these areas from the topics that follow in which the class or the individual pupil requires instruction.

The teacher should adapt the materials and the suggested activities in this section according to his/her need.

Diagnostic Research Tools Test

Directions: For each of the items below, select the letter of the best answer. Since this is a *diagnostic* test, do not guess if you are unsure of an item.

1. An index of books in a library is a) the *Readers' Guide* b) the *Librarian's Guide* c) *Books in Print* d) the card catalogue e) *The Book of Lists.*
2. The card catalogue is arranged a) by date of publication b) in alphabetical order c) by name of publisher d) in chronological order e) randomly.
3. The call number of a card in the card catalogue tells a) the telephone number of the publisher of the book b) the telephone number of the author c) the number of books in the library d) the name of the author e) the location of the book.
4. In the card catalogue, an author's name will appear a) on the author card b) on the subject card c) on the title card d) on the cross-reference card e) on a), b) and c) of the above.
5. Every book listed in the card catalogue has a) three call numbers b) only one call number c) more than three call numbers d) one call number of each type of file card e) one author.
6. The *Readers' Guide to Periodical Literature* contains listings of a) most scientific journals b) historical literature c) popular magazines d) reference books in the library e) major newspapers.
7. The *Readers' Guide* lists items by a) author and subject b) author and title c) subject and title d) author only e) subject only.

FOR THE NEXT THREE QUESTIONS, REFER TO THE FOLLOWING ENTRY FROM THE *READERS' GUIDE*.

ACID RAIN
Acid lakes from natural and anthropogenic causes. R. Patrick and others. bibl f il Science 211:446–8 Ja 30 '81

8. "ACID RAIN" is the a) title of the article b) author's name c) subject of the article d) cross-reference citation e) name used by Patrick.
9. The numbers 211:446–8 are a) the date and pages b) the date and volume c) the date and issue number d) the volume and issue number e) the volume and page numbers.
10. The letter "f" means the article a) is written with footnotes b) has been translated into French c) is factual d) was published in the fall e) is fiction.
11. The main purpose of a bibliography is to a) describe b) explain specialized vocabulary c) include other material such as tables and charts d) give the date and place of publication e) refer the reader to additional sources.
12. To see an overview of the material in a book, one should first consult the a) table of contents b) glossary c) index d) preface e) appendix.
13. Which of the following is not usually found in the title page of a book? a) city of publication b) publisher c) author d) copyright date e) title.
14. If a word is labeled "obs" in a dictionary it a) is no longer used b) is used only in conversation c) has two or more pronunciations d) has several meanings e) has more than one spelling.
15. If a word is colloquial it is a) no longer used b) used in formal writing c) new d) also obsolete e) used in informal writing and ordinary speech.
16. A thesaurus contains a) synonyms and antonyms b) miscellaneous facts c) pictures of famous people d) digests of book reviews e) homonyms.
17. The same general purpose of *Roget's International Thesaurus* is served by a) *Who's Who* b) an almanac c) *Columbia-Lippincott Gazetteer of the World* d) *Readers' Guide* e) *Dictionary of Synonyms*.
18. The vertical file holds a) pamphlets or clippings b) card catalogue cards c) book reviews d) reference book cards e) almanac listings.
19. For detailed recent information one should consult a) an unabridged dictionary b) the card catalogue c) an atlas d) an encyclopedia e) the vertical file.
20. The *Congressional Record* is indexed by a) topic b) speaker c) party d) topic and speaker e) party and topic.
21. The *Congressional Record* contains a) only the spoken words of senators and representatives b) only the bills that Congress is considering c) an alphabetical list of all the speakers for each day d) minutes of subcommittees of Congress e) statements or insertions which are not spoken by the member on the floor in addition to speeches by members of Congress.

22. An article in an encyclopedia is often followed by a) a glossary b) a biography of the author c) the date the article was written d) a bibliography e) another article on the same topic.

23. The *World Almanac's* index is unusual because it is a) not in alphabetical order b) located in the front of the book c) a separate booklet d) not revised every year e) arranged by date order.

24. In writing a paper on the subject "Solid Waste Disposal," one source to use for the most current information would be a) *McGraw-Hill Encyclopedia of Science and Technology* b) *Van Nostrand's Scientific Encyclopedia* c) *New York Times Index* d) Telephone Company Yellow Pages e) Cook and Munro.

25. *Books in Print* is a listing of books a) in a section of the library b) no longer available in your library c) that are still being sold by publishers d) that are found in every library e) that are most popular with readers.

ANSWER KEY

1. a
2. b
3. e
4. e
5. b
6. c
7. a
8. c
9. e
10. a
11. e
12. a
13. d
14. a
15. e
16. a
17. e
18. a
19. a
20. d
21. e
22. d
23. b
24. c
25. c

TOPIC II—HOW TO LOOK UP A TOPIC

Students need to be taught that they must look up the words of their topic. For example using the topic "Solid Waste Disposal," each word should be looked up in a periodical index such as the *Readers' Guide*. It is also necessary to train students to look up related topics which are part of or related to the main or central topic. Thus, to find additional information on Solid Waste Disposal, one might also examine Environmental Pollution, Sanitation, Open Air Burning, Landfill, Ground Water Treatment and related subtopics.

SUGGESTED ACTIVITY:

1. Provide several main topics. Elicit the words students would look up. Then elicit related sub-topics that could be looked up to provide additional information.

   Examples:

   Nuclear Power—Pros and Cons
   Human Experimentation
   Recombinant D.N.A.
   Cloning
   In Vitro Fertilization
   Laetrile
   Genetic Counseling
   Population Control
   Acid Rain
   Organ Transplants

   What sub-topics would you look up for each of these main topics?

2. Assign students a list of topics and have them gather general information on note cards through reading encyclopedia articles, chapters in textbooks, or assigned readings.
3. See also, Activity I in *Writing Manual*.

TOPIC III—HOW TO USE THE CARD CATALOGUE AND THE READERS' GUIDE

The card catalogue is an index to books in a particular library. Like the *Readers' Guide*, it is arranged in alphabetical order. Call numbers on books correspond to numbers on file cards in the card catalogue. Thus the call number is used to locate a book. There are several ways to use the catalogue. One may look up a topic, an author or a title. Some topics may even be cross-referenced with a special card for that purpose. However, no matter how many cards may appear for a book, it will have only one call number.

The *Readers' Guide to Periodical Literature* contains listings of many popular magazines. A few science publications such as *Scientific American, Science* and *Science Digest* are indexed. It lists items alphabetically by author and subject. Entries provide the topic, title of the article, author's name, whether or not a bibliography and/or footnotes and illustrations are used, the title or abbreviation of the title of the publication, the volume number, pages and date. The *Readers' Guide* also lists the names and addresses of all publications that are indexed.

SUGGESTED ACTIVITIES

Card Catalogue and *Readers Guide:*

1. Using the card catalogue in your local library list five works that may be of use to you on any one of the topics listed in Lesson 1. For each work list author, title, publisher, and date of publication.
2. Using the following sample page from the *Readers' Guide*, answer the questions below:
   a. In addition to the topic POLLUTION, under what other headings might information on pollution be found?
   b. What is the name of the article written by JAMES B. POLLACK?
   c. In what journal is James Pollack's article found?
   d. What do "bibl," "f" and "ll" mean?
   e. What is the name of an article dealing with pollution in New Brunswick?
   f. Where and when was it published?
   g. Scan the page to find an article on genes and inherited diseases. Under what heading is it listed? Under what other headings might it also be found?

POLITICS. Corruption in—*Continued*
Special prosecutor for Congressmen [bribery charges] J. Gickel. il USA Today 109:82-4 Mr '81
White connection [allegations of Libyan bribes to obtain export licenses for C-130 transport planes] C. Kaiser. il por Roll Stone p28 F 5 '81

France
Puncturing pomposity [Le Canard enchaîné, France; interview by A. Balk] G. Macé. il World Press R 28:30-1+ Mr '81

Germany, West
Scandal in Berlin that could weaken Bonn. S. W. Sanders. Bus W p56 F 23 '81

Israel
Irreligious ministry? [bribery trial of religious affairs minister A. Abuhatzera] E. Silver. por Macleans 94:37-8 F 23 '81

Poland
Workers vs. the fat cats. A. Deming and P. Martin. il Newsweek 97:47 F 16 '81

Quebec (province)
Thorn in the premier's paw [allegations of corruption involving R. Lévesque and Parti Québécois] D. Thomas. il por Macleans 94:39-40 Mr 9 '81

Thailand
High price of freedom [Western visitors imprisoned under heroin drug laws in city of Chiangmai] D. Maitland. il Macleans 94:15-18+ Mr 16 '81

United States
See Politics, Corruption in

POLITICS and blacks. See Blacks—Political activities

POLITICS and business. See Business—Political aspects

POLITICS and Christianity. See Religion and politics

POLITICS and education
See also
Political science—Study and teaching

POLITICS and industry. See Industry and state

POLITICS and literature
See also
Comic books, strips, etc.—Political aspects

POLITICS and newspapers. See Newspapers and politics

POLITICS and religion. See Religion and politics

POLITICS and science. See Science and state

POLITICS and the press. See Press and politics

POLITICS in literature
Madeleine Lee, meet Nancy Reagan [views of H. Adams in Democracy] W. Shapiro. Wash M 13:47-9 Mr '81

POLK, P. H.
Two worlds in sharp focus. M. Childress. il pors South Liv 16:130-2 F '81 *

POLLACK, James B.
Measurements of the volcanic plumes of Mount St. Helens in the stratosphere and troposphere: introduction. bibl f il Science 211:815-16 F 20 '81

POLLACK, Shep
Trade secrets [interview by C. Wyatt] por Work Wom 16:38 Mr '81

POLLAN, Stephen M. See Roy, G. Jt auth

POLLEN
Prospecting with the aid of bees [pollen contamination; theories of H. V. Warren] il Sci Digest 89:26 Mr '81

POLLINATION. See Fertilization of plants

POLLITT, Katha
Metaphors of women [poem] Atlantic 247:43 F '81
(int) See Malamud, Bernard. Bernard Malamud

POLLUTION
See also
Acid rain
Air pollution
Electric plants—Environmental aspects
Energy industries—Environmental aspects
Power plants—Environmental aspects
Radioactive pollution
Smelting furnaces—Environmental aspects
Soil pollution
Trade waste—Disposal
Water pollution

Environment. Sci News 119:152 Mr 7 '81

Control
See also
Industry and the environment
Water pollution—Control

Laws and regulations
See also
Air pollution—Laws and regulations

New Brunswick (province)
Suffer the little children [mental retardation survey and possible links to pollutants] C. Bruman. il Macleans 94:23 F 9 '81

New York (state)
See also
Love Canal case

Living with 214 cans of chemical worms [Porter, N.Y. disposal site of SCA Chemical Waste Services] L. McQuaig. il Macleans 94:12+ F 16 '81

Niagara's quiet crisis. J. Ferguson and M. Keating. il World Press R 28:57 F '81

Ontario
Niagara's quiet crisis. J. Ferguson and M. Keating. il World Press R 28:57 F '81

Texas
See also
Oil pollution—Texas

POLLUTION, Outdoor light. See Lighting, Outdoor

POLO
Polo makes a galloping comeback. D. C. Denison. il pors N Y Times Mag p40-3+ Mr 15 '81

POLONIUM
Effects of trace gases and water vapor on the diffusion coefficient of polonium-218. G. Frey and others. bibl f il Science 211:480-1 Ja 30 '81

POLOVCHAK, Walter, case
Littlest defector: 'here people care'. E. Keerdoja. por Newsweek 97:17+ Mr 16 '81

POLSTER, Jeanne
Arts and crafts movement in America. il Am Craft 41:76 F/Mr '81

POLVAY, Marina
Poppy seed potpourri. il Gourmet 41:42-3+ Mr '81
Saffron. il Gourmet 41:30-1+ Ja '81

POLYMERS and polymerization
See also
Plastics

Don't forget the magnet [work of N. J. Turro] SciQuest 54:5 Ja '81

POLYMORPHISM (biology)
Jumping genes help trace inherited diseases. R. Lewin. il Science 211:690-2 F 14 '81

POLYNESIA
See also
Marquesas Islands

POMERANZ, Virginia E.
Case for the working mother [interview by N. H. Clark] Harp Baz 114:184-5+ Mr '81

POMEROL wines. See Wine

POMUM, Magnum
Along the avenues. Gourmet 41:4+ Mr '81

POND, Clayton
Colorful world of Clayton Pond. D. A. Spencer. il por Am Artist 45:46-51 Mr '81 *

POND, Steve
Sir Douglas Quintet: crashing in on Nuevo Wavo. il Roll Stone p51-2 Ap 2 '81

PONDS
See also
Solar ponds

Stone and concrete pond adds sound and beauty. il Workbench 37:56+ Mr/Ap '81

PONTE, Lowell
How artificial light affects your health. Read Digest 118:131-4 F '81

PONY Clubs, United States. See United States Pony Clubs Inc

POOLE, Isaiah J.
Washington page. il Black Enterprise 11:27 F; 29 Mr; 21 Ap '81

POOR
See also
Homeless
Public welfare
Tramps

Public record [excerpt from the twelfth report, August 1980, of the National Advisory Council on Economic Opportunity] il Harpers 262: 56-7 F '81

Health and hygiene
Income, illness and the health gap. Sci News 119:59 Ja 24 '81

Housing
For rent, cheap, no heat. B. Koeppel. Progressive 45:23-5 Mr '81

Medical care
See also
Medicaid

New York (state)
See also
New York (city)—Poor

Philippines
See also
Manila—Poor

3. Study the following cards from a college library.
   a. Identify the cards as either subject, title, or author cards.
   b. What is the title of the work?
   c. Who is the author?
   d. When was it published?
   e. Who published the book?
   f. How many pages are contained in this book?
   g. Why is the date of publication important?

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                GENETIC ENGINEERING--SOCIAL ASPECTS.
QH          Goodfield, G. June.
442           Playing God: genetic engineering and the
.G66        manipulation of Life / June
            Goodfield. -- 1st ed. -- New York:
            Random House, C1977.
              xiii, 219 p. ; 22 cm.
              ISBN 0-394-40692-8

              1. Genetic engineering-- Social
            aspects.  1. Title.

QH442.G66                                  174/.2
                                           77-6023

NRIC                    B/NA  A  D7-002316 PLAYINGG 05/15/78
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                    Playing God.
            Goodfield, G. June.
QH            Playing God : genetic engineering and the
442         manipulation of Life / June
.G66        Goodfield. -- 1st ed. -- New York:
            Random House, c1977.
              xiii, 218 p. ; 22 cm.
              ISBN  0-394-40692-8

              1. Genetic engineering--Social
             aspects.  1. Title.

QH442.G66                                  174/.2
                                           77-6023

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TOPIC IV—HOW TO USE STANDARD REFERENCES—DICTIONARY, ENCYCLOPEDIA, ALMANAC, THESAURUS, VERTICAL FILE, NEW YORK TIMES INDEX

All students have used dictionaries; however, certain terms may not be known. Review the abbreviations "obs." for *obsolete* and "col." for *colloquial*. Explain that obsolete terms are no longer in use and colloquial ones are not appropriate for formal writing.

Encyclopedias may be used initially to develop some background, but their main value is the bibliography that is found at the end of the article on a particular topic. However, caution students that this list of sources may not be current.

For more recent information, the vertical file, the *New York Times Index* and an almanac should be consulted. The librarian will have to provide help with the vertical file and if possible the *Times Index*.

Students should be encouraged to consult a thesaurus to enlarge their vocabularies and eliminate redundancies from their prose. They might also consult a dictionary of synonyms for this purpose.

SUGGESTED ACTIVITIES

1. Consult with the school's librarian about the available reference material in your library.
2. Coordinate with the library the topics that are appropriate for the materials available.
3. Arrange either for the class to visit the library or for the librarian to bring reference books to the classroom. The purpose of the visit is to familiarize the students with these materials before they begin their research on their own. This activity will have more purpose if the students are provided with topics to work with during this visit.

TOPIC V—WHAT OTHER USEFUL SOURCES OF INFORMATION ARE AVAILABLE?

There are a number of specialized reference materials available to the research student. The following list is designed to help the student in his quest for direction for sources of information. Addresses of publications have been included should they not be available locally.

1. *Biology Digest (BD)* is designed specifically for high school students. It organizes, summarizes and indexes the most worthwhile scientific literature in the life sciences. It is published monthly except in June, July, and August by Data Courier, Inc., 620 South Fifth Street, Louisville, Kentucky 40202. It consists of a feature section, an abstracts section divided by topic, such as "Infectious Diseases", "Environmental Quality", and "Book Reviews," and an index section. Under "Environmental Quality," a student might find abstracts on climatology, ecology, air and water pollution, forestry, hydrobiology, and energy resources. *Biology Digest* should be available in most high school libraries. It is a most useful reference tool for the secondary school student.

The following illustration is from a section in "Environmental Quality" in *BD*. This excerpt could be produced by the teacher to give the class an example of the material found in *BD*. It could also be used as a method to improve comprehension, to generate discussion or to reenforce the application of current areas of study. The questions below are samples of the kind that might be asked.

1. What is the main problem in dealing with synthetic materials and their reactions in the environment? (Identification.)
2. Name three ways chemicals can travel through the environment. (Evaporation, precipitation, absorption.)
3. What does the word *innocuous* mean? (Harmless.)
4. Why has the precipitation over Scandinavia become increasingly acid over the last decades? (Sulfur emission into atmosphere.)
5. What will be the effect of acid rain on forest land? (Decreased forest production.)
6. How will acid rain affect watercourses? (Change in species composition of fish population.)
7. Which of these two *abstracts* concerns a more immediate and more hazardous problem for mankind? (Discuss.)

76/7-2161
Tracking the Elusive Pollutant.
Anonymous, Environmental Science and Technology, July 1976, 10(7):640-641.

With the onset of the chemical era came many chemicals that resist normal biological degradation processes. These synthetic materials must be confined or rendered innocuous to prevent environmental contamination. The EPA recently formed a 15-member Environmental Pollution Movement and Transformation Advisory Committee to aid in evaluating existing data concerning synthetic materials and their reactions in the environment. The main problem in dealing with these substances is identification, but accurate prediction of environmental reactions requires precise information about them and the environmental situation at hand.

Synthetic materials that cannot be biologically degraded are sometimes called xenobiotics or anthropogenics. They can usually be detoxified in an aqueous environment; trace metals, however, must be isolated. Chemicals can travel through the environment via evaporation, precipitation, or absorption. Reaction rates vary with changes in temperature and pH. Photolysis and hydrolysis—degradation by light or water elements—are both important transformation modes that render the original pollutant innocuous.

In the soil, it is more difficult to delineate between biological and chemical reactions. Pesticides, however, which have been observed closely, often decompose minimally in the soil; in the case of such chemicals, microbial activity and sunlight are the major degradation agents. Reduction (addition of an electron), another route to render chemical pollutants harmless, has been demonstrated successfully in the laboratory with DDT and toxaphene. Regardless of the transformation mode, the environmental impact of a chemical is linked directly to its concentration, its physical-chemical state, its interactions with environmental components, and its method of entry into the environment. The pH, temperature, sunlight, and soil composition further compound the problem, and both field observation and laboratory experimentation are necessary to find solutions.

76/7-2162
Effects of Acid Rain.
Lars Emmelin, Current Sweden, March 1976, (62):1-6.

During the last decades, precipitation over Scandinavia has become increasingly acid due mainly to sulfur emission into the atmosphere. The effects are largely unknown, but adverse ecological effects have been attributed. Sulfur is a naturally occurring element in the atmosphere. To this natural cycling has been added the release of sulfur through fuel combustion and industrial processes. Cycles of elements through ecosystems are finely adjusted flows which cannot always cope with excesses generated over short time periods. In Scandinavia, the amount of sulfur deposited as a result of human activity has doubled in the last 15-20 yr.

An important chemical characteristic of soil which helps to determine nutrient availability and capacity for production is acidity (pH). This acidity is also determined by the input of chemicals from the atmosphere. Ions carried down into the soil by water will alter the chemical composition of the soil and may influence the downward transport of chemicals through leaching. Due to the complexity of soil, the influence of acid precipitation will vary on different soils. On forest land, acid precipitation may be serious. The effects of the leaching of nutrients and the increased acidification will be proportionately greater on some of the most productive forest soils than on the already acid ones. The exact mechanisms are not yet known, but the effects of excess sulfur in precipitation will cause decreased forest production.

Increased leaching of nutrients from soils will affect watercourses, depending on the chemical composition of soils and on the amount of pollution reaching watercourses by atmospheric fallout and by other routes. Increased acidity will decrease the buffering capacity (the capacity to neutralize added acid) and this will influence production in lake ecosystems. The most important and immediate effect is the change in species composition of fish populations, resulting in the loss of valuable species such as salmon and trout.

It is clear that every effort to decrease sulfur releases must be made. In Sweden a long-term program for sulfur reduction in fuel oil has been introduced, and at present there is a general ban on the use of oil containing over 2.5% sulfur. A further ban on oil containing 1% sulfur is in effect in the three major urban areas of Sweden as well as in some counties.

2. The *Hastings Center* publishes a bi-monthly *Report* devoted entirely to discussions of ethical problems in biomedical, behavioral, and social sciences issues and in professional and applied ethics. The *Report* publishes brief, timely observations on new developments, longer essays, scholarly articles, a calendar of national events, and letters from readers. Delving into ethical and moral problems in the sciences as it does, the *Hastings Center Report* covers a wide range of areas which can be a source of information and stimulation for the research student.

   Additional information about the *Hastings Center Report* may be obtained by writing to Hastings Center Report, 360 Broadway, Hastings-on-Hudson, New York 10706.

3. *Public Affairs Information Service Bulletin (PAIS)* is a selective subject list of the latest books, pamphlets, government publications, reports of public and private agencies and periodical articles, relating to economic and social conditions, public administration, and international relations, published in English throughout the world. The PAIS tries to identify public affairs information likely to be most useful and interesting to legislators, policy researchers and students. It indexes publications on all subjects that bear on contemporary public issues and the making and evaluation for public policy, irrespective of source or traditional disciplinary boundaries. The *PAIS Bulletin* can be a useful reference tool if available.
   The following excerpt is from the June, 1981 No. 3 *PAIS Bulletin.* Teachers who wish to strengthen students skills in the use of this reference source might make up questions based on the contents of certain pages as is illustrated below:
   1. In what *journal* does an article appear which discusses the disputes over responsibility in the chemical waste dump at Love Canal? (*Reason,* February 1981.)
   2. What is the name of the article Jon Steeler and Gerald Bulanowski collaborated on concerning hazardous wastes? ("Abandoned Hazardous Waste: Dumped on Everybody.")
   3. List three articles on hazardous wastes which do *not* contain illustrations (il). ("Allocating the Costs of Hazardous Waste Disposal;" "Sitting Hazardous Waste Facilities: a Dialogue;" "Hazardous Waste Violations: A Guide to Their Detection, Investigation, and Protection;" and "The New Hazardous Waste Management System: Regulation of Wastes or Wasted Regulation?")
   4. Under what other heading might someone look if he or she were researching "Health in the United States"? (Executives—Health; Mental Health; Public Health; Veterans—Health.)
   5. How many entries on this page contain a bibliography (bibl)? (Six.)

HARDWARE INDUSTRY
See also
Directories - Hardware industry

HARVESTING. See Agricultural products - Harvesting.

HAWAII
See also
Banking - Hawaii.
Bill drafting
Directories - Trade unions
Income - Hawaii.
Investments, Foreign - Japanese - Hawaii.
Ocean thermal power plants - Regulation

HAZARDOUS MATERIALS

Jasen, Georgette. Medical sleuths: fear of toxic materials creates more demands for epidemiologists. *Wall St J 197:1+ Ap 14 '81*

Export-import trade

Forming a hazardous export policy: an interview with Robert Harris of the Council on Environmental Quality. il *Multinational Monitor 1:12-14 O '80*

† United States. House. Com. on For. Affairs. Subcom. on Internat. Econ. Policy and Trade. Export of hazardous products: hearings, June 5-September 9, 1980. '80 iv+421p bibl tables (96th Cong., 2d Sess.) (SD Cat. no. Y 4.F 76/1:H 33) (Stock no. 052-070-05509-0) pa U.S. $6.50; elsewhere $8.15—*Supt docs*

Transportation

United States. House. Com. on Govt. Operations. Govt. Activities and Transportation Subcom. Aviation safety: hazardous materials handling: hearing, August 16, 1980. '80 iii+149p tables chart (96th Cong., 2d Sess.) pa —*Washington, DC 20515*

Safety measures

† United States. Senate. Com. on Commer., Science and Transportation. The Hazardous Materials Transportation Amendments of 1980: hearing, July 10, 1980, on staff working draft, "The Hazardous Materials Transportation Amendments of 1980." '80 iii+44p (96th Cong., 2d Sess.) (Serial no. 96-121)—*Washington, DC 20510*

HAZARDOUS OCCUPATIONS. See Occupations, Dangerous.

HAZARDOUS WASTES

Allocating the costs of hazardous waste disposal. *Harvard Law R 94:584-604 Ja '81*

Engstrom, Theresa. Hazardous waste: learning to cope [effect of the Resources Conservation and Recovery Act on some New England businesses; problems of locating a waste treatment plant]. il tables *New England Bus 3:12-15 Mr 2, 14-17 Mr 16, 56-8+ Ap 6 '81*

Fine, John C. Toxic waste dangers. il *Water Spectrum (Corps of Engineers) 13:23-30 Winter '80/'81*

† League of Women Voters Educ. Fund. Siting hazardous waste facilities: a dialogue. [O '80] [4]p (Pubn. no. 516) 35c—*League women voters*

Steeler, Jon and Gerard Bulanowski. Abandoned hazardous waste: dumped on everybody. il *State Legislatures 6:16-21 O '80*

† United States. House. Love Canal: health studies and relocation: joint hearing, May 22, 1980, before the Subcommittee on Oversight and Investigations of the Committee on Interstate and Foreign Commerce, U.S. House of Representatives and the Subcommittee on Environment, Energy, and Natural Resources of the Committee on Government Operations. '80 v+71p il (96th Cong., 2d Sess.) (Serial no. 96-191) pa —*Washington, DC 20515*
Examines federal and state actions to evacuate 700 families temporarily from a hazardous waste site near Niagara Falls, N.Y., under the Federal Disaster Relief Act.

† United States. House. Com. on Merchant Marine and Fisheries. Dredge spoil disposal and PCB contamination: hearings, March 14 and May 21, 1980, on exploring the various aspects related to the dumping of dredged spoil material in the ocean and the PCB contamination issue. '80 v+698p bibls il tables diags charts maps (96th Cong., 2d Sess.) (Serial no. 96-43) pa—*Washington, DC 20515*

United States. House. Com. on Public Works and Transportation. Subcom. on Oversight and Review. Implementation of the Federal Water Pollution Control Act (regulation and monitoring of toxic and hazardous chemicals): hearings, June 18-26, 1980. '80 xiv+2200p bibls il tables diags charts maps (96th Cong., 2d Sess.) ([Pubn.] 96-59) pa—*Washington, DC 20515*

† United States. Law Enforcement Assistance Admin. Hazardous waste violations: a guide to their detection, investigation, and prosecution. Mustokoff, Michael M. F '81 82p (Nat. Center on White-Collar Crime. Operational Guide to White-Collar Crime Enforcement) pa—*Washington, DC 20531*

United States. Senate. Com. on Fin. The Environmental Emergency Response Act: hearings, September 11-12, 1980, on S. 1480. '80 v+679p bibl il tables diag charts maps (96th Cong., 2d Sess.) pa—*Washington, DC 20510*
A bill to provide for liability, compensation, cleanup and emergency response for oil, hazardous substances and waste released into the environment.

Zuesse, Eric. Love Canal: the truth seeps out [chemical waste dump at Love Canal, near Niagara Falls; parties involved and issues in the disputes over responsibility]. il diag maps *Reason 12:16-33 F '81*

Regulation

Friedland, Steven I. The new hazardous waste management system: regulation of wastes or wasted regulation? [emphasis on the Resource Conservation and Recovery Act of 1976]. table *Harvard Environmental Law R 5:89-129 no 1 '81*

HEADS OF STATE

† United States. Central Intelligence Agency. Nat. For. Assessment Center. Chiefs of state and cabinet members of foreign governments: a reference aid. O '80 iv+131p index (CR CS 80-010) pa U.S. $36 a yr.; elsewhere $72—*Nat tech info service.; —Photoduplication Service, Library of Congress, Washington, DC 20540*
Issued monthly.

HEALTH
See also
Executives - Health.
Mental health
Public health.
Veterans - Health.

Lunde, Anders Steen. Health in the United States [trends in life expectancy, prevention and nutrition and health care]. tables charts *Annals Am Acad 453:28-69 Ja '81*

† United States. Public Health Service. Office of Disease Prevention and Health Promotion. Prevention '80. ['81] viii+143p (22 x 28 cm.) tables charts (Dept. of Health and Human Services. DHHS (PHS) Pubn. no. 81-50157) pa—*Washington, DC 20201*
Federal disease prevention activities and health status trends.

Yantek, Thom. Impacts of the British National Health Service: a quasi-experimental study [possible effects upon the health of the British population]. bibl tables charts *Policy Studies J 9:706-21 Spring '81*

Bibliography

† United States. Nat. Center for Health Statis. Clearinghouse on Health Indexes. Clearinghouse on Health Indexes: cumulated annotations, 1977. Ap '80 75p bibl index (Dept. of Health and Human Services. DHHS Pubn. no. (PHS) 80-1225) pa—*3700 East-West Highway, Hyattsville, MD 20782*
Annual with quarterly supplements.

Information sources

† United States. Nat. Center for Health Statis. Catalog of public use data tapes. N '80 iii+61p tables (Dept. of Health and Human Services. DHHS Pubn. no. (PHS) 81-1213) pa—*3700 East-West Highway, Hyattsville, MD 20782*

HEALTH AND HUMAN SERVICES DEPARTMENT. See United States - Health and human services department.

HEALTH AND WELFARE PLANS. See Employees' benefit plans.

HEALTH, EDUCATION AND WELFARE DEPARTMENT. See United States - Health, education and welfare department.

HEALTH, INDUSTRIAL. See Industrial hygiene.

4. *Social Sciences Index (SSI)* is a cumulation index to English periodicals in the fields of anthropology, economics, environmental sciences, geography, law and criminology, planning and public administration, political sciences, psychology, social aspects of medicine, sociology and related subjects. Published quarterly with a broad cumulation each year, it is sold only on a service basis. If not available, write for further information: *Social Sciences Index*, H. W. Wilson Company, 950 University Avenue, Bronx, N. Y. 10452.
5. *Sociological Abstracts (SA)* is a collection of abstracts in the field of sociology and related disciplines published five times a year. *SA* contains a table of contents, a subject index, an author index, and a source index in addition to abstracts from conference papers and journals. *SA* can be of advantage to the student if available, in areas where science and sociology overlap. The following excerpt from *SA* illustrates the kind of abstracts a student might find in the area of sociology of sexual behavior.

81L4340

Bhatia, Pratima (Lucknow U, 226007 UP India), **Aspects of Female Sterilization**, ◆ *The Eastern Anthropologist*, 1979, 32, 2, Apr-June, 107-116.

¶ Family planning in India is almost entirely a product of governmental programs. Demographic, SE, & other characteristics of 100 individuals or couples who sought tubectomy in Uttar Pradesh are reviewed: acceptors were predominantly Ru (79%); almost all (95%) were Hindu; 51% were of high castes; 67% of the wives, but only 31% of husbands, were illiterate; 79% of the women were unemployed; 62% of the husbands were in government service; income levels ranged up to Rs. 300 per month; & wives averaged 32.3 years of age, husbands 37.8. Motives for the tubectomy included child welfare, government imposition, personal problems, financial incentive, & avoidance of disincentive. These findings support the view that tubectomy is brought about by government incentive & coercion rather than by free choice. W. H. Stoddard

81L4342

Clark, Margaret Pruitt, Bean, Frank D., Swicegood, Gray & Ansbacher, Rudi (U Maryland, College Park 20742), **The Decision for Male versus Female Sterilization**, *The Family Coordinator*, 1979, 28, 2, Apr, 250-254.

¶ The increasing popularity of sterilization as a method of birth control among married couples who have completed their childbearing underscores the need for knowledge about differences between couples choosing M & F procedures. Four sets of variables are delineated that may be important for the decision; examined are their relationship with the choice of M or F procedure among a sample of married couples (N = 188). The results are argued to support the idea that men require more social support in the decision than women, & that men tend to get involved in the decision-making process only when they undergo the procedure themselves. 1 Table. Modified HA

Additional information about *SA* may be obtained by writing to *Sociological Abstracts*, P.O. Box 22206, San Diego, California 92037.

6. *The Congressional Record* can be an interesting source of information on the public proceedings and debates of each House of Congress. Published daily, it contains the amended comments of the House of Representatives and the Senate with an additional section devoted to extensions of remarks. The *Congressional Record Index* is an alphabetical listing of speakers and topics debated in the Congress during two sessions. This can be a particularly useful tool for the student in that it gives him/her the most current debate and action on bills and resolutions in our national government. It is also an excellent example of bias as well as fact in controversial areas.

   Students should be cautioned when using the *Congressional Record* that particular political, social economic, and/or moral-ethical views of government officials can cloud and distort the true picture. Additional information may be obtained by writing to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

   An example of what the student might find under ECOLOGY in the *Congressional Record Index* follows:

CONGRESSIONAL RECORD INDEX

ECOLOGY
Addresses
Conference on Acid Rain, Senator Moynihan, S5113-S5115
Conference on Acid Rain, (sundry), S5110-S5113
Articles and editorials
Running on Empty—The Land and Water Conservation Fund at Zero, E2539
Bills and resolutions
Clean Air Act (see S. 1206)
Clean Water Act (see S. 1274)
Environmental Quality Control Act (see S. 1210)
Noise Control Act: amend (see S. 1204; H.R. 3071)
Oilspills: liability for damages caused by (see H.R. 85)
Research and development (see S. 1205; H.R. 3115)
Letter
Kansas City air quality, Malcolm F. Baldwin, S4925
Memorials of legislature
Automobile fuel efficiency standards: Hawaii, S5199, H2426
Remarks in House
Energy development: impact on health, H2404
EPA construction grants: review funding, H2381
Great Lakes Protection Act: introduction (H.R. 3600), E2358
Soil erosion: impact on agriculture economy and environment, H2172
Remarks in Senate
Automobile industry: suspend certain emission control standards, S5199
Clean Water Act: amend (S. 1274), S5525
Kansas City: air quality, S4925
Statement
Conservation, Representative Parris, H2207
Text of
S. 1274, Clean Water Act amendments, S5525

7. The *Congressional Record—Extensions of Remarks* frequently presents local newspaper or magazine articles written to support, defend, or attack an issue under debate. Reproductions of excerpts from these remarks can point out the differences between objective and subjective reporting as the following partisan and controversial view of the Love Canal issue illustrates,

   Questions which focus on the validity and reliability of these remarks in the *Congressional Record* can be of value in helping students to evaluate their sources to generate discussion and to formulate their own opinions. For example:

   1. What problems does Congressman Don Ritter state are inherent in seeking a cleaner, safer environment?
   2. What does Congressman Ritter mean by "risk assessment"?
   3. What is the point he claims of the Bethlehem, Pa., *Globe-Times* article?
   4. What does he state he is doing to help solve the problem he discusses?
   5. Judging from the *Globe—Times* article, what do you feel Congressman Ritter's position would be on the "Love Canal" controversy?
   6. Ritter states that often politics enters the discussion of potential hazards and "early on scientific logic is readily surpassed by sensationalism and the rhetoric of scare." Do you think this is true with reference to the "Love Canal"? List any other areas in which you feel this statement might be seen to be true.
   7. Does the author of the article, Louis Rukeyser, accurately report and interpret the data he uses and does he draw logical conclusions?
   8. Is Mr. Rukeyser specific or general in his deductions and/or assumptions? What expertise does he have in the area of discussion? Is he relating excerpts, statistics, *etc.* in their true context?
   9. What do the words *rapacious, paranoia, brouhaha, precipitate, inflammatory* and *notoriously* mean? What feelings do they connote?
   10. Is there any reason to believe either Congressman Ritter or Mr. Rukeyser might be biased? Explain.
   11. How would you evaluate this passage as being a reliable source?

NEED FOR BETTER PERSPECTIVE ON POTENTIAL HAZARDS

HON. DON RITTER

OF PENNSYLVANIA

IN THE HOUSE OF REPRESENTATIVES

Tuesday, August 4, 1981

● Mr. RITTER. Mr. Speaker, I rise today to discuss an issue that I have been promoting since I came to the Congress 3 years ago. An issue that encouraged me to give up the private sector and academia for elected office. The issue is bringing a better scientific basis to regulation and ultimately regulatory reform.

We all face risks to our health and safety in daily life which we try to reduce. The public wants the benefits of a cleaner, safer environment while the subject of regulatory reform enjoys an ever wider appeal. People are also concerned about counterproductive regulation and its effect on inflation, their jobs and the well being of their communities. It is evident that regulatory reform must include targeting of scarce regulatory dollars into the areas of greatest risk or dangers to people. With finite tax dollars, regulating risks that turn out to be negligible or very small, means real dangers may go unattended while economic damage is great. In an age very much dependent on technology, we need to put hazards in perspective. We need to draw on all our communications abilities to bring that perspective to the public. Then, take the most intelligent actions within that perspective to support our regulatory efforts.

From the scientific standpoint, we must understand what we are dealing with. A scientist does not claim to understand something like a "potential" hazard until he has objectively assessed it and its effects. Too often, in the past, we have not been objective in our assessment of potential hazards. Politics enters the fray early on and scientific logic is readily surpassed by sensationalism and the rhetoric of scare. I was reminded of this fact when I read an article in the Bethlehem, Pa., newspaper, the Globe Times, which reviewed some of our recent knee jerks which have caused unnecessary anxiety for the public. The article makes the point that calm, reasonably objective evaluations of a technical-regulatory situation seldom makes news headlines. The article is a compelling argument to give risk assessment its due. I believe that risk assessment will contribute to giving some perspective to the health, safety, and environment regulatory tangle we are in. Legislation I have introduced, I hope will add to the efforts to better the technique and the use of risk assessment as a factor in our regulatory process. I have introduced my revised bill, The Risk Analysis Research and Demonstration Act of 1981, this year after some productive hearings last year. In addition to developing the methods, this bill offers to organize and give some direction to risk assessing actions already going on in our Federal agencies. Risk assessment needs to be understood more fully, both its strengths and its limitations as we seek the goal of putting hazards in perspective for the public.

For the benefit of my colleagues the Globe Times article follows:

[From the Bethlehem (Pa.) Globe-Times, July 24, 1981]

RELAXED SKEPTICISM ANTIDOTE TO FOOD HEALTH SCARES

(By Louis Rukeyser)

NEW YORK.—It's a cliche of journalism—unfortunately, still all too true—that those who make violent and irresponsible charges will tend to capture bigger headlines than those who come along later and attempt, calmly and objectively, to set things right.

Today I'd like to take a few moments of your time to observe how this phenomenon has been operating lately in an area that affects every one of us emotionally, physically and economically: the effects, real and alleged, of chemicals and food additives on our personal well being.

To some, it's all simple—and simplistic. All chemicals and additives are bad, existing only because of rapacious corporate greed. Back to the forest primeval!

Alluring and nonsense. As one with three children of his own, I'm as concerned as anyone with protecting them from needless risk. But the notion that giving free rein to anti-corporate paranoia is the route to a healthier and happier America has now gotten so far out of hand that it deserves to be brought to account. Consider:

(1) In case you missed it (and it wouldn't be surprising if you did), a careful study by the New York State Department of Health, published after painstaking review by the highly respected magazine Science—shows that people living near Love Canal don't get cancer at a faster rate than any of New York's citizens.

This highly publicized industrial waste site near Niagara Falls has been the cause of near-panic for area residents for some time now. The very name "Love Canal" has become an inflammatory symbol, to many, of grievous harm to a hapless population. Now comes this little-noticed investigative report on what actually happened. It isn't likely to be the last word on this controversy, to be sure, but it's worth emphasizing that the first word, at least, is surprisingly reassuring.

(2) A much-ballyhooed 1978 study done at MIT for the Food and Drug Administration indicated that rats fed sodium nitrite showed an increased rate of lymphatic cancer. Fears were fanned of still another horrible carcinogen in our daily food.

Yet last year, after further study, the FDA and the Department of Agriculture admitted—ever so quietly—that there really wasn't sufficient evidence linking sodium nitrite to cancer.

(3) The Occupational Safety and Health Administration, which consistently has been among Washington's most conspicuous overreachers, was characteristically quick on the trigger in promulgating rules for exposure to the solvent benzene.

In July 1980, the Supreme Court voided these rules—on grounds that OSHA simply couldn't justify its speculation with scientific facts.

(4) Perhaps the loudest brouhaha of all was over saccharin, the artificial sweetener that raised such havoc when fed in massive doses to rats. This column was an early voice raising serious, pointed questions about the hysteria being promulgated over saccharin; in this case, fortunately, the public resisted panic, and Congress moved to prevent a precipitate ban.

Now, guess what? Long after the furor had subsided, the American Health Foundation, the National Cancer Institute and Harvard University's School of Public Health all reported that clinical studies on 4,000 humans led to the conclusion that absolutely no tie could be established between normal use of saccharin and bladder cancer.

The point is not to reject all charges blindly nor to discourage those carrying on legitimate and desirable research. But we ought to recognize: (a) that the "publish or perish" syndrome sometimes leads academicians to hype their findings and rush to go public; (b) that ideologues are always anxious for new ammunition, however flimsy, with which to attack an economic-growth system they deplore; and (c) that bureaucrats are notoriously quick to issue regulations but slow to admit error in the light of new facts.

Zero risk is unattainable in this vale, but it is natural for all of us to seek a healthier world. There is no conflict between that goal and a calmer, less paranoid reaction to the next scare headline. Too often the truth, when it catches up, is far less terrifying and far less publicized. A dose of relaxed skepticism has frequently proved the best medicine of all.●

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8. *Abridged Index Medicus (AIM)* is a monthly bibliography based on articles from 117 English language journals in the field of biomedical literature. Aimed primarily for individual practitioners and libraries of small hospitals and clinics, *AIM* attempts to cover all fields of clinical medicine. Articles are indexed under the most specific terms available. Thus, if an article is concerned with erythromycin, it would be indexed under that term, rather than the broader antibiotics. Under antibiotics one would find articles dealing with them generally or articles dealing in a very general way with a large number of antibiotics. As can be seen, *AIM* is a very specialized reference tool. It is a service not always available in local libraries, but of potential value. Further information may be obtained by writing: Editor, *Index Medicus*, National Library of Medicine,Bethesda, Maryland 20209.

   The following sample is taken from *AIM* Vol. 12, No. 7, July 1981:

ABRIDGED INDEX MEDICUS

JUL 1981

PLEURAL NEOPLASMS

The outcome of patients with pleural effusion of indeterminate cause at thoracotomy. Ryan CJ, et al. Mayo Clin Proc 1981 Mar;56(3):145–9

PNEUMATOSIS CYSTOIDES INTESTINALIS

Pneumatosis intestinalis in the small bowel of an adult–a radiological sign of a serious post–operative complication. Smith EE, et al. Br J Radiol 1981 Mar;54(639):266–7

PNEUMOTHORAX

Excision of bullae without pleurectomy in patients with spontaneous pneumothorax. Ferguson LJ, et al. Br J Surg 1981 Mar;68(3):214–6

POETRY

Yefim Alekseyevich Pridvorov. Shampo MA, et al. JAMA 1981 Apr 17;245(15):1561

POISONING

Areawide chemical contamination. Lessons from case histories. Miller RW. JAMA 1981 Apr 17;245(15):1548–51

Management of patients after self–poisoning [letter] Gardner R. Lancet 1981 Mar 28;1(8222):725

Targeted intervention in the control of accidental drug overdoses by children. Palmisano PA. Public Health Rep 1981 Mar–Apr;96(2):150–6

9. *Current Contents (CC)* is an easy-to-scan, weekly publication that gives the reproduced tables of contents from important journals in a number of different areas. It is published in seven separate editions: Agriculture, Biology and Environmental Sciences; Social and Behavioral Sciences; Clinical Practice; Engineering, Technology and Applied Sciences, Life Sciences, Physical, Chemical and Earth Sciences; and Arts and Humanities. In addition to listing the most up-to-date contents of journals in particular fields, every issue of *CC* contains an Author-Address Directory that provides a full mailing address for the senior author of almost every article listed.

10. *Current Contents* can be of tremendous help in keeping current with the literature in a field. Most secondary schools and public libraries, however, do not subscribe to its services. If students have access to large colleges or univesities, they may be able to make use of this source. Additional information about *CC* may be obtained by writing to Institute for Scientific Information, 3501 Market St., University City Science Center, Philadelphia, PA 19104.

SUGGESTED ACTIVITIES:

1. Have students write for samples of materials if they are not available locally. After materials have been received, the class can review them, discuss the merits of the individual works, and make specific recommendations to the school library and/or administration concerning their possible acquisition.
   The following is an alphabetical list of the editorial addresses of the material reviewed in this section:

Abridged Index Medicus	Index Medicus National Library of Medicine, Bethesda, Maryland 20209
Biology Digest	Data Courier, Inc. 620 South Fifth Street Louisville, Kentucky 40202
Congressional Record *Congressional Records–Extensions of Remarks* *Congressional Record Index*	Superintendent of Documents Government Printing Office Washington, D.C. 20402
Current Contents	Institute for Scientific Information 3501 Market Street University City Science Center Philadelphia, Pa. 19104
Hastings Center Report	The Hastings Center 360 Broadway Hastings-on-Hudson New York 10706
Public Affairs Information Service Bulletin	Editorial and Business Office (PAIS) 11 West 40th Street New York, New York 10018
Social Sciences Index	H. W. Wilson Company 950 University Avenue Bronx, New York 10452
Sociological Abstracts	Sociological Abstracts P.O. Box 22206 San Diego, California 92037

2. Arrange for a class trip to visit a local college library or medical center to use reference materials which are not in the school or public library.
3. Many college libraries will be pleased to allow your students to use their reference sections with special permission. Discuss this possibility with the local college people following a class trip.

TOPIC VI—HOW TO LOCATE AND WRITE TO PERSONS AND ORGANIZATIONS IN THE FIELD OF STUDY

Students should be cautious not to overlook sources of information available through writing and/or telephoning directly. Frequently authors of articles will be more than willing to share their knowledge with students who ask. Reprints of articles and personal comments can be a great help to the student and a source of greater involvement with the scientific community.

Companies, agencies, organizations and/or committees involved in particular areas will often assist students by sending copies of studies, conference reports, bulletins, announcements, etc. Position papers from large companies can give students a strong slanted view point which they may choose to accept or challenge.

In letters to authors or organizations, students should be clear, concise, and courteous. They should explain who they are, why they are writing, and what information they wish to obtain. In writing, they should follow an acceptable business letter form. Their letters should be personal and must contain a return address and date. Emphasize the need also to enclose a self-addressed stamped envelope.

SUGGESTED ACTIVITIES:

1. To convey the idea of audience, discuss how a letter to the following might differ:
   a. to an employer
   b. to a close friend
   c. to a parent or close friend
   d. to a lover
   e. to an annoying neighbor
   f. to a famous person
2. Have students write to authorities and individuals in the field they are researching. Use authors of journal articles, textbook editors, business executives, government officials, etc. Where possible, supply them with correct names, titles, addresses. *Current Contents* might be of use as every issue contains an Author-Address Directory that provides a full mailing address for the senior author of almost all articles listed.
   The following sample form may be given to the students from which to model their letters:

123 Main Street
(Street Address)

Louisville, Kentucky 40202
(City, State, Zip Code)

September 25, 1982
(Date)

Marc Alexander
c/o The Hastings Center
360 Broadway
Hastings-on-Hudson, New York 10706

Dear Mr. Alexander:

I am a high school student researching the topic of euthanasia for my science course. I found your article "Premature Burial and the Signs of Death" in the June, 1980 issue of *The Hastings Center Report* most interesting and informative.

I noted that your article was adapted from a presentation to The Hastings Center's Death and Dying Research Group in December 1978 which was supported in part by a grant from the Henry J. Kaiser Family Foundation.

I would greatly appreciate it if you would supply me with information on how I could obtain the full text of your presentation and how I could gather more information about the other research which came out of this report.

I am enclosing a stamped self-addressed envelope for your reply. Thank you for your help and cooperation.

Yours truly,

Anita Marie Guarino

TOPIC VII—WHAT ARE THE PARTS OF A BOOK AND HOW ARE THEY USED?

Most students need to be taught how to use a book efficiently. They should be told to read the chapter headings in the table of contents to determine if a book will be useful. They should also be referred to the index, appendix, glossary and bibliography. The function of each part should be explained. When students do footnoting and bibliography, refer them to the title and copyright pages for the information needed.

SUGGESTED ACTIVITIES:

1. Examine classroom text. Elicit exact title, author, publisher, city of publication and date. Have class write sample footnotes and bibliography using the example below as an example:

> FOOTNOTE
>
> Samuel N. Namowitz and Donald B. Stone, *Earth, Science—The World We Live In* (Princeton: D. Van Nostrand Company, Inc., 1980), p. 536.
>
> Bibliography
>
> Namowitz, Samuel N. and Donald B. Stone. *Earth Science—The World We Live In*. Princeton: D. Van Nostrand Company, Inc., 1980.

2. Give the class specialized words or terms to look up in the glossary.
3. Compare the time it takes to look for page numbers of specific topics through random searching, through the table of contents, and through the index.
4. Assign topics to be found in the textbook index. Have students sub-divide these topics. See also Activity 1 in *Writing Manual*.

SECTION III: WRITING

Introduction

In a very real sense, every teacher is a teacher of writing. This section of the *Course Manual* is intended to assist teachers in instructing their classes in how to write a research paper. It is designed primarily to supplement the separate *Writing Manual* which gives students detailed information on the practicalities of how to write the research paper, but it can be used by schools which do not use the *Writing Manual* as a broad outline to the teaching of the research paper.

The *Writing Manual* was designed as a separate text *for the students* to read and follow. It is a reference tool *for the student*. This section of the *Course Manual* will present additional procedures and suggestions for the teaching of writing. As individual skills vary greatly, instruction in writing skills should be geared wherever possible to the individual needs of each student. The teacher is encouraged to select those topics and activities most appropriate for his/her students.

Some of the skills students will need to practice in the writing of research paper include:

Planning a rationale with objectives;

Dealing effectively with a number of research sources;

Gathering information on a specific topic by consulting published materials, by observing, and by interviewing;

Recognizing the nature of evidence;

Separating relevant from irrelevant matter;

Taking meaningful and useful notes to record significant data;

Understanding and practicing the ethics and traditions of research, using quotations and giving credit, avoiding plagiarism, avoiding distortion of the author's ideas;

Learning the forms and conventions for preparing footnotes and bibliographies;

Citing authorities and giving credit for their thoughts and ideas;

Thinking logically;

Analyzing the material with a view to organizing a logical, clear, and forceful presentation;

Relating cause and effect;

Using facts to support opinions;

Supporting opinions with reasoning;

Writing the paper in appropriate and effective form;

Connecting ideas so as to secure coherence;

Writing the paper in appropriate and effective form;

Avoiding inappropriate mannerisms in writing, such as stiff, over-inflated, verbose language;

Using simple direct, vigorous language and avoiding pretentious vocabulary;

Forming individual beliefs and decisions based upon an analysis of existing information.

TOPIC I: HOW TO PLAN A RATIONALE WITH OBJECTIVES

One of the most frightening and frustrating experiences for students is to stare at a piece of blank paper and worry about how they are ever going to hand in that research paper which has been assigned. Like many insomniacs who, instead of relaxing at bedtime, become tense worrying about their lack of sleep, students often tense up at even the thought of writing or speaking.

To help start meaningful writing projects, the teacher should give the students a sense of audience. Writing is a form of communication, and we communicate to others. For whom are the students writing? The teacher must determine this and make sure the class understands the concept of audience.

The idea of audience can be explained in any number of ways. Students should be aware different styles in writing are influenced by audience. In writing research papers the teacher should decide upon the audience. A paper written for review by a scientist will have a different style from one written to be read by other students. Frequently, the teacher may find that an audience of peers will be less intimidating and more rewarding for students.

Included in any course plan for a research paper must be a time frame. How long will it realistically take students to accomplish the goals that are set? Young people need guidelines. They work better within a set framework or schedule. In addition to assigning a final date when the research paper is due, teachers would do well to establish other more immediate deadlines. The following dates should be carefully thought out in advance by the teacher and lessons should be organized around helping students meet these dates:

1. Date for selection of topic;
2. Date for submission of topic with student's name and class on 3x5 index card to teacher;
3. Date for submission of preliminary bibliography to teacher;
4. Date for submission of preliminary outline to teacher (Student should be instructed to keep one copy for himself);
5. Date for submission of final paper (Student should keep carbon copy).

SUGGESTED ACTIVITIES:

1. To convey idea of audience, discuss how a letter to the following might differ.
   a. to an employer
   b. to a close friend
   c. to a parent or close relative
   d. to a lover
   e. to an annoying neighbor
   f. to a famous person
2. Have students write to authorities and individuals in the field they are researching. Use authors of journal articles, textbook editors, business executives, government officials, etc. Where possible supply them with correct names, titles, and addresses. For example, write a business letter concerning the situation described below.

   Situation: You are writing a science research paper on the ethics of government experimentation in the use of drugs. You have just read an informative article in the February 1979 issue of *The Hastings Center Report*. The article was written by Glenn C. Graber and Frank H. Marsh entitled "Ought a Defendant Be Drugged to Stand Trial?"

   Task: Write a business letter to Glenn C. Graber, Ph.D., in care of *The Hastings Center Report*, 360 Broadway, Hastings-on-Hudson, N.Y. 10706, requesting further information on this topic.

   In your letter be sure to:

- Explain your situation.
- Explain exactly what help you wish from Dr. Graber.
- Give complete and correct information.
- Use an acceptable business letter form.
- Enclose a self-addressed stamped envelope.
- Be clear, concise, and courteous.

TOPIC II: HOW TO TAKE MEANINGFUL NOTES

Understanding the process of writing, the student will also be aided in his reading comprehension. The research paper is an exercise in thinking, reading, and writing. By analyzing how formal writing is accomplished, the student can be in a better position to read with discrimination, objectivity, and comprehension.

Dr. Walter Paul of the Cornell University Reading-Study Center experimented to determine how students learn most easily. His findings benefit students in their reading of technical scientific materials. Briefly his system consists of the following:

1. Get an overview:
   a. What is your purpose in reading this selection?
   b. Examine title.
   c. Read introduction (first two or three paragraphs).
   d. Check headings in large or boldface print.
   e. Glance at pictures, charts, diagrams.
   f. Read summary.
   g. Prepare to take notes.
2. Read section by section to pick out key ideas:
   a. Mark key ideas and important details on separate note cards.
3. Closely, thoughtfully, read the difficult passages:
   a. Mark important ideas.
   b. Paraphrase in your own words.
4. Recite to yourself:
   a. Look away from the selection.
   b. Force yourself to concentrate on recalling what you have read.
5. Reflect:
   a. Think about what you have read.
   b. Do you agree, disagree, understand, doubt, etc.?
   c. Can you probe the *why*, challenge the author's reasoning, predict outcomes, relate what you are reading to experiments in class, to the world outside your classroom, and to what you have read before?

6. Review:
   a. Recapture the broad chapter plan. Look again at the total picture.
   b. Check your notes on crucial points. Have you quoted exactly or paraphrased accurately?

Students should keep in mind, it is a skill to select material from reading and turn it into notes. Skills demand practice. Good notes are essentially an outline from various sources of material. To assist them in compiling their notes, students should be instructed to keep their notes organized. Their notes will be more effective if they:

1. Select the main thought and supporting details.
2. Omit unnecessary details.
3. Show the thoughts in outline form.
4. Quote exactly only for particularly significant points.
5. Group related ideas under group topics.
6. Use the outline to improve understanding and maintain direction.

Students should be made aware of the usefulness of tables of contents, indices, glossaries, headings and sub-headings summaries.

SUGGESTED ACTIVITIES:

1. Reading comprehension is an essential part of note taking. Translating stiff, verbose, over-inflated language into crisp, clearcut English can illustrate a student's comprehension of a selection. It can also supply practice in note taking and writing style. For example, have students "translate" the following excerpt from *Science*, Vol. 201 18 August 1978 on "Gene Splicers":

   "Many gene splicing experiments consist of splicing DNA from the organism of interest onto a virus or plasmid which can replicate in the human gut bacterium *Escherichia* coli. The inserted DNA is, as it were, xeroxed each time the bacterium divides, a process known as cloning. A major reason for drawing up safety rules was the suggestion that the bacteria might in some circumstances gain pathogenic features from the foreign DNA sequences being cloned in them . . . "

2. Duplicate passages from journals, newspapers, or other sources. Have students practice picking out the main idea, outlining the organization of the selection, identifying the method of development, writing sample notes, etc. The discussion generated by their analytical thinking can be further enhanced by selection of passages about controversial subjects. Questions dealing with reliability and credibility of sources and differentiating between fact and opinion can also be introduced at this time.

For example, students may read the following passage and then answer questions on it:

> A cure has been found for cellulite. According to British sources, cellulite, the fatty material that deposits itself on the thighs and buttocks of females may now be dramatically reduced through the use of a miracle fluid and 18 hypodermic needles. The needles are placed in a circular machine called a "hedgehog," which resembles an English animal, like our porcupine, that carries quills on its body.
>
> The new procedure, which was first developed in France where it was widely acclaimed, involves filling the needles with a special fat-dispensing fluid. The liquid is then injected into the problem spots and the fatty lumps soon disappear like magic.
>
> The "hedgehog" therapy, as it is called, is claimed to be the best remedy for cellulite because the lumpy fat tends to "settle" on the female body and cannot be removed by traditional diets or exercise.

a. What is the best title for this passage? Look for the topic sentence. How does "Cellulite" compare with "A possible remedy for cellulite"?

b. How was the passage organized? (Chronological, inductive, deductive, cause and effect?)

c. How is paragraph #2 developed?

d. Write sample notes you would extract from this passage.

e. Evaluate the source. Is it impartial, objective, subjective, biased?

f. What evidence can you give for your evaluation of the selection? (See words and phrases like "British sources", "best remedy", "disappear like magic", "miracle fluid", etc. Note lack of documentation, generalizations, oversimplification.)

g. Where might you expect to find an article such as this one? (Scientific journal, newspaper, or gossip magazine?)

3. Select a passage from a text or journal and delete certain words. Have students supply the missing words.

   This form of reading exercise is called CLOZE and can evaluate comprehension as well as stimulate vocabulary development. It can be done with or without supplying missing word choices. For example, in the following passage some words are missing. Wherever a word is missing, there is a blank line with a number on it. Next to the passage you will find the same number and five words. Choose the word that makes the best sense in the blank.

Before anesthetics were discovered, surgery was carried out under very severe time restrictions. Patients were awake, tossing and screaming in terrible pain. Surgeons were forced to hurry in order to contain suffering and minimize shock. __1__ was essential. Haste, however, did not make for good outcomes in surgery. No surprise, then, that the __2__ were often poor.

1. a) Blood
   b) Silence
   c) Speed
   d) Water
   e) Money

2. a) Quarters
   b) Teeth
   c) Results
   d) Materials
   e) Families

The discovery of anesthetics happened, in part, by accident. During the early 1880's, nitrous oxide and ether were used for entertainment. At "ether frolics" in theaters, volunteers would breathe these gases, become lightheaded, and run around the stage laughing and dancing. By chance, a Connecticut dentist saw such a __3__ . One volunteer banged his leg against a sharp edge. But he did not __4__. He paid no attention to his wound, as though he felt nothing. This gave the dentist the idea of using gas to kill pain.

3. a) Show
   b) Machine
   c) Face
   d) Source
   e) Growth

4. a) Dream
   b) Recover
   c) Succeed
   d) Agree
   e) Notice

At first, using the "open drip method", ether and chloroform were filtered through a cotton pad placed over the mouth and nose. This direct dose was difficult to regulate and irritating to the nose and throat. Patients would hold their breath, cough, or gag. This made it impossible for them to relax, let alone sleep. Consequently, surgery was often __5__ . It couldn't begin until the patient had quieted and the anesthesia had taken hold.

5. a) Delayed
   b) Blamed
   c) Required
   d) Observed
   e) Repeated

Today's procedures are safer and more accurate. In the "closed method" a fixed amount of gas is released from sealed bottles into an inhalator bag when the patient exhales. He inhales this gas through tubes with his next breath. In this way the gas is __6__ . The system carefully regulates how much gas reaches the patient.

6. a) Heated
   b) Cleaned
   c) Controlled
   d) Selected
   e) Wasted

For dentistry and minor operations, patients need not be asleep. Newer anesthetics can be used which deaden nerves only in the affected part of the body. These __7__ anesthetics offer several advantages. For instance, since the anesthesia is fairly light and patients remain awake, they can cooperate with their doctors.

7. a) Local
   b) Ancient
   c) Natural
   d) Heavy
   e) Three

The correct answers for these questions are:

1. (c)
2. (c)
3. (a)
4. (e)
5. (a)
6. (b)
7. (a)

4. Supply students with a group of phrases, ideas, or notes in random order. Have students put these ideas in logical order for development. If the teacher chooses, the class may then practice writing a brief report from these notes. The written report should be organized, contain all facts supplied and be written in clear, correct English. Students may exchange papers at conclusion of exercise, read and correct each other's paper, and return for revision. This can be a valuable practice in recognizing audience, organizing, writing, proof reading, evaluating and revising.

   For example, give students the following directions:

   Directions: Write a brief report using the situation and the set of notes given below. To help you organize your report, rearrange the notes on scrap paper before you start to write. In your report, be sure to include *all* the information in the notes.

   Situation: You have been assigned to give a report to your science class on the hazards to man from epidemics of antibiotic-resistant diseases. The notes you took from your research are in the box below:

Second epidemic of antibiotic-resistant typhoid fever occurred Mexico in 1972.

Shiga dysentery = disease of primates.

More than 112,000 cases with more than 12,500 deaths in first epidemic.

Two epidemics in recent years.

Antibiotic-resistant Shiga dysentery started in Central America in late 1968.

Typhoid fever = disease of humans.

1st epidemic causes — poor sanitation, inadequate medical care, lack of education.
2nd epidemic started in small Central Mexican village.

In both cases, American tourists contracted diseases and brought back to the U.S.

Typhoid causes — municipal water system failed, people drank water from canal running through a village.

Epidemics prevented because of adequate sanitation and medical care.

Students should understand that there can be many acceptable ways to write a report based on these notes. One acceptable way would be as follows:

> The hazards to man from epidemics of antibiotic-resistant disease can be seen from two epidemics which have occurred in North America in recent years. The first was an epidemic of antibiotic-resistant Shiga dysentery in Central America, starting in late 1968. There were more than 112,000 cases with more than 12,500 deaths. Shiga dysentery, a disease of primates was caused by poor sanitation, inadequate medical care and lack of education.
>
> The second epidemic was an epidemic of antib[illegible]resistant typhoid fever which occurred in Mexi[illegible]72. It originated in a small village in Central Mexic[illegible] the municipal water system failed, and the reside[illegible]ık water from a canal which ran through the village. Typhoid fever is a disease of humans.
>
> In both of these epidemics, some American tourists contracted the disease and brought it with them to the United States, but no epidemic ensued in this country because adequate sanitation and medical care prevented the spread of either disease.

TOPIC III: HOW TO LIMIT THE TOPIC

Writing is thinking and entails more that the regurgitation of facts. It is a selective process which calls for analysis and discriminate thought.

The topic chosen by your students should be appropriate for them. It will be appropriate if it appeals to them or if they can develop an interest in it as they work on it. In addition, it must be acceptable to the intended audience.

A topic is properly limited if the students know enough about it or can learn enough in a reasonable time period and if it is not too general or broad to be treated in the time-frame available.

It is difficult but essential for students to limit the scope of their topics. The teacher may choose to ease some of this difficulty by supplying ready made topics. He or she may also elect to give students the freedom to choose whatever topic they wish. In certain specific cases this latter method may be beneficial, but teachers should be cautioned to remember the limited experiences of their classes and the students' need for direction.

SUGGESTED ACTIVITIES:

1. Using sample reading comprehension selections, have students practice picking out the best title for reading passages. Emphasize the best title refers to the entire selection and is limited in scope. Check newspaper headlines for examples
2. Demonstrate through the use of Post Office zip codes, the process from general to specific.
3. Have students arrange topics in order from most general to specific.
   Carcinogens in the air
   Causes of lung cancer
   Lung cancer risks for asbestos workers in construction trades
   Cancer — leading cause of death in United States
   Lung cancer risks for asbestos workers

4. Practice limiting topics. For example, have students narrow the following broad topics:
   - Euthanasia
   - Sterilization
   - Health Hazards
   - Scientific ethics
   - Space technology

TOPIC IV: HOW TO BEGIN RESEARCH ON LIMITED TOPICS

Only after students know where they want to go, can they proceed to get there. The process of beginning research demands organization as well as specific skills.

The writer of any research paper should be organized and methodical. Teachers can aid students to develop straight, clear thinking. Unity, coherence, and emphasis are principles of writing that should be taught.

Students should be aware that there are specific methods to achieve these principles in their writing. While they may not use all of them, they will benefit from studying and practicing these methods. By limiting their topic, for example, they will concentrate on writing a paper which includes only those points pertinent to the chosen subject. This will result in unity.

There are a number of different ways to organize a paper. Again, a review of these ways can help the student clarify his approach and give coherence to his research paper. Students should be familiar with the following methods of organization.

1. Chronological — the order of time;
2. Spatial — the order of space (used most often in description, to show where objects are in relation to one another);
3. Inductive — proceeding from specific examples to generalization based upon them;
4. Deductive — starting with a general statement and then illustrating, proving, or applying it;
5. Easy to difficult;
6. Least to greatest — order of climax;
7. Reasoning from cause to effect or effect to cause.

While the actual format of the paper will be established by the teacher, an understanding of the dynamics and the methods of writing can help the student in his writing of the paper.

Emphasis will be attained by the position the student chooses to take. In his conclusion, the student will stress his informed opinions and recommendations. Through his research the student should develop a thesis which he should try to prove or maintain.

In addition to having difficulty with organization, many students encounter problems in development. By exposing students to the chief methods of development, which may appear in paragraphs singularly or in combination, the teacher makes the techniques of clear, concise, intelligent writing easier to comprehend and practice. A student will find it less difficult to discover something to say if he understands the following methods of development:

1. Supplying details
2. Using examples
3. Using comparison or contrast
4. Expanding a definition
5. Presenting causes of effects
6. Offering logical proof

SUGGESTED ACTIVITIES:

1. Gather general information on a topic through reading encyclopedia articles, chapters in textbooks, or assigned readings.
2. Develop a thesis (the central or controlling idea of the research paper). The thesis is a statement to be proved or maintained against objections. Students must be able to defend their thesis.
3. Provide students with limited topics to be developed into thesis statements. For example, have them write a thesis for the following topics:

   The effect of marijuana smoking on driving

   The case against artificial sweeteners

   Cigarettes as a health hazard

   A sample of an acceptable thesis might be: "Marijuana smoking produces an altered state of consciousness which impairs perception of spacial relationships causing driving hazards." With a definite thesis like this, the student is prepared to take meaningful notes to support his viewpoint.

4. Compose paragraph with scrambled sentences. Have students rearrange sentences. For example: Read the following passage and answer the question below it.

   My uncle smokes incessantly and won't give it up. Cigarettes cost much more than they used to. He has asthma. He spends a lot on smoking. He coughs all the time. Sometimes he smokes at night, lying in bed. Then he complains about shortness of breath. Once he fell asleep with cigarette still lit. He is tired all the time. His young children say they want to start smoking. Manufacturing cigarettes uses power, labor, and farmland which could be used for other purposes. The pillow began to smolder. His children want to do the things he does. He woke up because he smelled the smoke and he put the fire out.

This paragraph gives several reasons why the writer's uncle should stop smoking.

a. Are the reasons in logical order?

b. Do all these reasons belong in the same paragraph?

c. How can they be arranged so they are more convincing?

d. What is the best way to arrange ideas so that they are most effective in getting a reader to agree with them?

TOPIC V: HOW TO FORM LOGICAL AND OBJECTIVE OPINIONS

In writing any research paper, there is a tendency to compile a list of other people's findings, ideas and opinions. The students should be encouraged to make their own judgments about issues based upon the findings of their individual research. Critical thinking is most important in a research paper.

The teacher should constantly remind the students they are to draw their own conclusions and recommendations from the facts they have researched. In their conclusion, their opinions and recommendations must be clear cut, rational and objective, and supported by substantial reliable evidence. An unsupported opinion, however, is like a bridge without supports. Acknowledging sources for information cited is extremely important in all research papers. Accurate documentation in the body of the paper enhances the value of students' opinions and recommendations.

SECTION IV: CASE STUDIES

Introduction

The scientific and technological advances of recent years had major impacts on our individual and collective lives. These same developments have had and will continue to have implications for ethics also. The basic conceptions of life and death, of what it means to be human, and of individual's rights versus society's rights are difficult to justify with the new conditions resulting from advances in biology and medicine. These problems are illustrated clearly in recent court decisions, in daily news events, and in current literature and art. The parameters of these areas obviously extend beyond the scientific community and are applicable for study in language arts, social studies, sociology, psychology, and humanities classes in addition to the science class. The discussion generated by the study of the following cases is a worthwhile and beneficial challenge which needs to be addressed by our schools.

The individual case studies are designed to stimulate discussion and with the aid of the teacher to help formulate student realization and understanding of the ethical problems facing mankind today. The cases explore issues for which there are no easy answers. Following each case study is a series of questions which focus the students' attention of the ethical ramifications of each issue.

In classroom discussion students should be led to examine and utilize their speaking and listening skills. They should be encouraged to develop a main idea, to use supporting material, and to express their thoughts vividly and naturally. In any discussion of this nature, the pupils should feel free to express their own views, listen to the views of others, and defend and modify their thoughts in an open honest manner.

The case studies are easily adaptable for use in a variety of classroom situations. The teacher should adapt the activities to the needs of the particular students and the particular class. To function effectively in our modern world, the student must develop, in addition to reading and writing skills, sound listening and speaking skills. Listening and speaking are complex and interrelated acts that must be developed as the individual child shows the physical, intellectual, social, and emotional readiness. The case studies presented may be used on several levels for individuals within the same class. Sophisticated pupils may be functioning at a higher level of development than indicated by the activities for a particular grade level; less verbal youngsters may be functioning at a lower level. Adaptation to the student's individual development should be of paramount concern to the teacher. It is especially important that *all* students participate in the listening and speaking activities of the class.

In conducting classroom discussions, the teacher should make every effort to foster student leadership. There should be an atmosphere of free discussion, but the teacher should assume leadership to insure:

a. Everyone has a chance to contribute his/her ideas.
b. There is thoughtful and courteous listening.
c. The discussion centers only on the issue at hand.
d. Good voice and speech habits are practical.

As the case studies themselves are about controversial situations for which no easy solutions are available, the teacher should be cautioned not to lead the discussion to some predetermined personal belief. The students should be encouraged to express their beliefs and to discuss them openly. The teacher's role is not to proselytize or to preach, but to stimulate the students into making their own decisions based upon the available facts and knowledge.

The teacher may use a variety of methods in the use of the case studies. Depending upon the needs of the class and the practicality of the circumstances, the teacher may choose other methods to:

a. Read the case study of the class and then discuss the questions.
b. Duplicate the case study and distribute it as a reading assignment and then discuss the questions.
c. Duplicate the case study and the questions and then have the class answer the questions in oral or written form.

Many valuable benefits can be derived from the lively discussion of these cases. The study of the meaning and the awareness of the complexities in the contemporary issues that surround us is relevant and essential for today's youth. The thought process and cognitive activities involved will help pupils to read, write, speak, and think with discernment. The sequence of the case studies presented is purely arbitrary, and the teacher is free to pick and choose, adapt and modify as his or her needs indicate. The following list is intended to clarify for the teacher some of the possible objectives to be reached from the use of the case studies:

a. to develop skills in cooperative problem solving;
b. to develop ethical attitudes conducive to living in a democratic society;
c. to develop respect for the opinion of others;
d. to express a complete thought orally and/or in written form;
e. to recognize and use a main idea and a central theme;
f. to speak with clear, exact, and vivid language;
g. to utilize patterns of organizations, such as —
   - comparison and contrast

- cause and effect
- inductive and deductive reasoning
- definition
- time order
- spatial order;

h. to use various supporting material, such as —
- personal observations
- statistics
- reference to recognized authorities
- analogies
- examples
- visual aids;

i. to recognize pitfalls in reasoning, such as —
- fallacies of evidence
- fallacies of argument
- propoganda devices;

j. to learn to withhold final judgment until all the available facts are known;

k. to establish habits of critical thinking and listening;

l. to develop awareness of the importance of questioning the ideas and points of view presented by others;

m. to learn to avoid the tendency to oversimplify or to generalize;

n. to engage in informal discussion to reach a conclusion or solve a problem.

CASE STUDY #1 — REGULATING ANTI-AGING DRUGS

Thomas Lockhart is the president and chief executive officer of Lockhart Pharmaceuticals. His company has been doing basic pharmacological testing on a series of compounds attempting to identify an agent that will affect the basic processes of aging.

In its early work, the company tested procaine analogues, Vitamin E, BHT, and a series of other compounds reported to have life-span extending properties. They found, however, that the most promising was a compound that would be marketed under the trade name of Sinemort. The drug would be very inexpensive to produce, and promises to be a money maker for the company as well as, in Lockhart's view, a great help to mankind.

The compound has proven promising in animal testing, and Lockhart is now considering human trials. In fact, he himself has been taking the drug on an experimental basis and is enthusiastic about its promise. The drug being tested is already marketed for use in humans as an anti-depressant. Although it has not been widely used for this purpose because there are other more effective drugs available, the compound has been demonstrated to be safe in humans at dosage levels above those contemplated in the clinical trial. In fact, it has been found safe for use in children.

Lockhart is working with Wilson Jeffers, his medical director, to prepare the IND (investigation of new drug) application for the Food and Drug Administration. They have reached the point where they have to list the possible harmful effects of the drug. According to Jeffers, the side effects are mild, rare, and immediately reversed upon discontinuing the drug. Dr. Jeffers remarks jokingly, "We could say that the drug will also change the lifestyle of the population, increase the size of the labor force, bankrupt the Social Security Administration, create new and unknown family relationships, possibly make the country more conservative politically, and make drug taking routine from puberty on."

The FDA is charged with investigating and evaluating each IND application and with eventually establishing that the drug is safe and effective before approving it for general use. It is staffed with pharmacologists and lawyers to review applications.

Should Lockhart Pharmaceuticals be obliged to include the social, political, and life-style risks of their drug in the IND application? If not, who should take on that task?

Reprinted with permission of the Institute of Society, Ethics and the Life Sciences: Sidney Callahan and James F. Childress, "Regulating an Anti-Aging Drug", *Hastings Center Report*, June 1978, pp. 19–20.

CASE STUDY #1 — SUGGESTED QUESTIONS

1. What kind of research is Lockhart Pharmaceutical involved with at the present time?
2. What is the present use of the drug Sinemort?
3. What are the medical outcomes of the IND testing program?
4. According to Dr. Jeffers, what are some of the social, political, and life-style risks of their drug?
5. What is the significance of the name Sinemort?
6. Is the scientific method being ignored by procedures employed by Thomas Lockhart? Explain.
7. Identify some of the changes that might take place in family relationships as a result of the drug's use?
8. Is a pharmaceutical company justified in marketing its products without consideration of the social, political and life-style effects of the drug? Explain.
9. Who should decide the possible risks and benefits of a new drug? Why?
10. Which is more important, the quality of life or the quantity of life? Explain.
11. Should restriction of the usage of this drug depend upon financial ability, mental capability and/or social usefulness? Explain.
12. How would your life change if you have extraordinary longevity?
13. If longevity drugs exist, who should be responsible for the broader social problems of caring for the health and welfare of the individual?
14. Would the pharmaceutical company be justified in charging a high price for the drug? What further implications would this have?

CASE STUDY #2 —A SUICIDE ATTEMPT AND EMERGENCY ROOM ETHICS

After the car that he is driving at high speed hits a telephone pole, Mr. D. is brought to the hospital emergency room in serious condition. The physicians who examine him recommend surgery to repair a major internal hemorrhage. But the sixty-eight-year-old man refuses, saying that he wants to be "left alone to die." The physicians also learn that three weeks earlier Mr. D. was diagnosed as having carcinoma of the tongue. He has refused surgery for the lesion and has asked his own physician not to tell his wife that he has a fatal disease.

The hospital physicians believe that Mr. D. will die without surgery for the hemorrhage, and they call a psychiatric resident to evaluate the patient. Dr. M. interviews Mr. D. and finds him coherent, rational, and alert. Mr. D. describes himself as a man who values independence. He feels he has had a good professional life as an engineer, and a good personal life with his wife and two children. He expresses some sadness at his situation, but says, "I have had a good full life, and now it's over."

Dr. M. suggests, and Mr. D. does not deny, that the automobile accident was a deliberate suicide attempt. What should Dr. M. recommend? That the patient's treatment refusal for immediate surgery be accepted as the act of a rational person? That the refusal not be honored, and a court order sought on the grounds that a presumed suicide attempt is *per se* evidence of mental illness?

Reprinted with the permission of Institute of Society, Ethics and the Life Sciences: Michael Jellinek, Richard B. Brandt, and Robert E. Litman, "A Suicide Attempt and Emergency Room Ethics," *Hastings Center Report*, August 1979, pp. 12–13.

CASE STUDY #2 — SUGGESTED QUESTIONS

1. What is the presumed reason for the automobile accident?
2. What are the reasons that Mr. D. gives for rejecting surgery?
3. Why is Dr. M. placed in a moral dilemma as a result of Mr. D's rejection of surgery?
4. Who else should be involved in the decision as to whether or not surgery should be performed?
5. Is there evidence that Mr. D. is ambivalent in his suicidal attempt and is really expressing irrational behavior?
6. Does an individual have a right to end his life for any reason?
7. Should Dr. M. view surgery as extraordinary means in keeping Mr. D. alive since he has cancer?
8. Is society justified in imposing its moral values on the individual?
9. Should the information on Mr. D.'s carcinoma affect the decisions of the emergency room doctor?
10. If you were the judge in such a case, how would you decide the fate of Mr. D?

CASE STUDY #3 — FAMILY WISHES AND PARENT AUTONOMY

Ralph Watkins, a seventy-five-year-old man, was admitted to the intensive care unit of a university hospital in acute respiratory distress. He was anxious but fully alert and gasping for help. A retired laborer, Mr. Watkins had been suffering from a chronic pulmonary disease for the past fifteen years. For the past five years he had become progressively debilitated. Prior to admission he had been confined to his home and depended on his wife for the most basic of care: without her assistance he could not dress or feed himself. He had been a fiercely independent man and still enjoyed ordering people around. His wife and married son were totally devoted to him.

The diagnosis was bilateral pneumonia, and Mr. Watkins was given antibiotics and put on a mechanical respirator with supplemental oxygen. Within two weeks the pneumonia was largely cleared and Sarah Radburn, his physician, began attempts to wean him from the respirator. Unfortunately, he had become "respiratory-dependent" as a result of a combination of poor nutrition, possible new damage to his lungs, weakened respiratory muscles, and fear of breathing on his own. Despite a slow, cautious approach with much reassurance, the weaning attempts repeatedly failed. Mr. Watkins, short of breath and terrified, would demand to be placed back on the respirator.

Dr. Radburn rated the ultimate chance for successful weaning as "maybe 20 percent." The patient became more and more discouraged with his lack of progress and the frequent painful medical procedures (constant intravenous feeding, frequent needle punctures for arterial blood gases, suctioning, and so on). After three weeks of unsuccessful efforts, Mr. Watkins refused to cooperate with further attempts at weaning. His wife and son became concerned that he had given up the "will to live." They begged the medical staff to "do something to save him." Although he had become less communicative, he remained alert and aware and, in the opinion of the staff, was fully competent. He told Dr. Radburn he wanted the respirator disconnected. "I want to die," he said.

What is the physician's responsibility in this case? Should the physician honor the patient's request? If we assume the patient is legally competent to make medical decisions, on what basis, if any, can the physician refuse or postpone acting on the request to stop life support? How much weight should be given the family's wish to "save" the patient?

Reprinted with permission of the Institute of Society Ethics and the Life Sciences: Stuart J. Younger, David L. Jackson and William Ruddick, "Family Wishes and Patient Autonomy," *Hastings Center Report*, October 1980, pp. 21–22.

CASE STUDY #3 — SUGGESTED QUESTIONS

1. What is the age and general physical condition of Ralph Watkins?
2. What is the significance of Mr. Watkins' becoming "respirator-dependent"?
3. Show evidence that Mr. Watkins has given up the "will to live."
4. How does the family react to Mr. Watkins' condition?
5. Do you think that Dr. Radburn's primary responsibility is to try for 20 percent chance of saving his life?
6. Does the wish "to die" represent a temporary depression in reaction to pain or a rational desire to terminate his life?
7. Does Mr. Watkins have the moral right to refuse medication and the use of the respirator to extend his life?
8. Should the family's desire, or considerations of their welfare, deter Dr. Radburn from "honoring the patient's request"?
9. Is society justified in allowing patients to refuse life-saving treatments?
10. If society allows autonomy in patients' request for terminating their life, is there a legitimate fear that the next step would be society dictating the termination of life?

CASE STUDY #4 —ACTIVE EUTHANASIA WITH PARENTAL CONSENT

Andrea was a nine-year old girl who had been diagnosed as having cystic fibrosis at the age of thirteen months. Since then she had been hospitalized twelve times, eight times during the last year. When admitted for the last time; she was already receiving an experimental antibiotic, which was being administered in an attempt to control a resistant pneumonia superimposed on severely damaged lungs, a result of her underlying disease. She was at that time a severely ill, emaciated child with moderately labored breathing. She seemed to have no interest in her environment and refused to communicate with anyone but her mother.

Because of the severity of the child's illness and because the parents had accurately perceived that the experimental antibiotic was a "last ditch" attempt to control her pulmonary infection, the physicians discussed with the parents their perception of "extreme medical measure" and the significance of a "No Code" order. The parents indicated that in the event of a cardiac or respiratory arrest, they did not want their child to be resuscitated and the appropriate "No Code" order was written. The child was not involved in these conversations or subsequent decision making, nor had the mother previously been able to answer her daughter's questions about death and dying.

As the child's condition continued to decline, the parents asked how much longer she would live and how she would die. At one point the father said:"Watching your own child die is worse than dying yourself." This comment led to a discussion of active euthanasia utilizing intravenous potassium chloride or a similar drug. The physicians pointed out that no matter how hopeless a situation or the amount of suffering that the patient and family were enduring, the law prohibits the active taking of a patient's life. They refused to consider this option.

The following day Andrea's heart began to fail. Her condition became progressively worse, and she died approximately 48 hours later. During these last two days her parents were appalled by her grotesque appearance, with "eyes bulged out like a frog," and were in great despair because of her steadily deteriorating condition. They felt helpless and impotent to alleviate their daughter's distress. Medical treatment was continued to the end, and no measures were taken to hasten Andrea's death.

Approximately two months after her death, the mother was asked if she would still have given permission for active euthanasia if she had been offered that option. She replied, "Yes."

Should active euthanasia be permitted to spare the patient and family from suffering when death is inevitable?

Reprinted with permission of Institute of Society Ethics and Life Sciences: Hunter C. Leake III, James Rachels, and Philippa Foot, "Active Euthanasia with Parental Consent," *Hastings Center Report*, October 1979, pp. 19–21.

CASE STUDY #4--SUGGESTED QUESTIONS

1. According to the story, what are the physical effects of cystic fibrosis?
2. What precipitates the initiation of the "No Code" decision?
3. Why do the parents consider active euthanasia?
4. Why are physicians willing to allow death, when they could have fought it off for while longer?
5. Is there a difference between a no-code designation which allows people to die and active euthanasia?
6. What justification can be used to require that Andrea suffer a forty-eight hour period of dying?
7. Should children old enough to understand have life and death situations explained to them?
8. Would it have been morally wrong for doctors to give a lethal injection to Andrea?
9. What should we think about active euthanasia in relation to children below the age of understanding and mentally incompetent adults?
10. Would Andrea's parents really have been able to live with the grief of losing her if they thought that they had ordered the lethal injection partly to spare themselves the pain of seeing her as she would become?

CASE STUDY #5—STUDYING GRIEF WITHOUT CONSENT

John Clark, a graduate student at a major university, wanted to research the emotional needs of families who had a dying relative. He decided that the best way to conduct this research was to work as a participant-observer in a hospital. He already had training and experience as a counselor, and he added to his qualifications by taking a course to become a nursing assistant.

A small community hospital interested in family care allowed him to volunteer for ten hours a week as a nursing assistant and counselor. The hospital had never conducted medical research before and had no committee for the protection of human subjects. In fact, none was required by state or federal law at the time. Clark informed the administration and staff of his research intentions and received their approval for his work.

Working in the intensive care unit and the emergency room, Clark gave basic care, took vital signs, and assisted the nurses. When a critical care patient was admitted to the unit, he was assigned to work with the family. He provided counseling, helped them deal with the hospital administration, acted as an information liaison between staff and family during non-visiting hours, and stayed with the family when they were told of his death.

Following each death, he wrote a case history and maintained a checklist of common grief reactions. He showed these reports to no one. After a period of three months, he wrote a paper reporting his findings. From this study, the staff developed a course to teach nurses how to deal with the critical care patient's family.

The families Clark counseled were told only that he was a nursing assistant and counselor working with the hospital to give attention to their needs. They responded very positively to the services that he provided. They were not told that a research project was being conducted or that a study would be written.

Clark later decided to use his study as a central part of his doctoral dissertation, and to extend his research where necessary. The university at which he was enrolled had an active research review committee for the protection of human subjects, which was required to examine all research conducted under its auspices.

Should Clark and the hospital have obtained the consent of the families to participate in the research even though it was not legally required? Should the chairman of Clark's department now send the research study to the university's review committee? If so, what should the committee recommend?

Reprinted with permission of the Institute of Society, Ethics and the Life Sciences: Linda M. Calvin-Rhodes,Michael Jellinek, and Ruth Macklin, "Studying Grief Without Consent," *Hastings Center Report*, August 1978, pp. 21–22.

CASE STUDY #5—SUGGESTED QUESTIONS

1. According to our story, why was John Clark working at the hospital?
2. What aspect about John Clark's working at the hospital raises ethical questions?
3. How was John Clark's research used at the hospital?
4. In considering your answer to the preceding question, could the hospital have trained personnel in this area without using John Clark's research?
5. If asked, do you think that most families might have granted consent for John Clark's work?
6. Would it have made a difference if John Clark had manipulated these families or treated some differently from others in order to observe varying responses to his own actions?
7. Should Clark and the hospital have obtained consent from the families even though it was not legally required?
8. Does this case violate the moral imperatives that people should be treated as ends in themselves, never solely as means?
9. Does it automatically make an activity morally wrong if a vague element of deception is present when a portion of the facts is withheld?
10. Should the families feel angry, hurt and degraded, if they discover a covert research project was the basis for these additional services rather than Clark's or the hospital's therapeutic concern?

CASE STUDY #6—HEALTH RISKS AND EQUAL OPPORTUNITY

Mark Dalton, a thirty-two-year-old histology technician, was hired six months ago by a large chemical company. He has proven to be highly skilled and produces excellent slides at a rate exceeding his co-workers. Recently after he took a week's sick leave, the employee health department nurse was surprised to learn that he is suffering from chronic renal disease. His entrance medical questionnaire did not mention any problem.

Since his job requires exposure to chemical solvent vapors at levels permissible by OSHA regulations, the company physician counseled him that continuing exposure to the vapors could exacerbate the disease.

Company management found a job for which he would qualify at the same rate of pay; but two current employees, one of whom is female, who are eligible for promotion are interested in the job. Both have better training and longer service with the company than Dalton.

Management has grounds for dismissing Mark on the basis of false representations about his health. If Dalton is given the available job to protect his health, it is likely that the woman employee who is better qualified will file a complaint charging discrimination with the Equal Employment Commission.

Should Dalton be fired? Given the safer job? When three workers have a varied claim to a job, one based on health, one on seniority, and the third on equal opportunity, which should prevail?

Printed with permission of Institute of Society, Ethics and the Life Sciences: Robert E. Stevenson, Deborah Johnson, and Knut Ringen, "Health Risks and Equal Opportunity", *Hastings Center Report*, December 1980, pp. 25–26.

CASE STUDY #6—SUGGESTED QUESTIONS

1. What was Mark Dalton's job and how could his working conditions exacerbate his chronic renal disease?
2. On what grounds can management dismiss Mark Dalton?
3. What is the other alternative available to management and why is that a problem?
4. Does a company's responsibility end when it informs the employee of health risks that exist in the working environment?
5. Did the worker act irresponsibly in not revealing the chronic renal condition at the time of employment?
6. Suppose Mark Dalton chose to continue working as a technician. Would it be wrong for the company to insist that he resign in his own best health interest?
7. If moved to another job, should Mark Dalton be given precedence over other candidates?
8. Suppose Mark Dalton developed the renal problem while working for the company. What obligations does the company have to Mark Dalton?
9. If you were one of the other employees eligible for promotion, how would you react to Mark Dalton's case?
10. Should a company refuse to hire an individual because of a particular health or genetic condition?

CASE STUDY #7—FORCED TRANSFER TO CUSTODIAL CARE

Mrs. B., seventy-four years old, has diabetes and is partially blind. She has lived in a nursing home for the past ten years, and the State Medicaid agency pays her expenses. She feels secure in the home, and she has made many friends there.

The state is trying to save money by caring for its elderly medical patients at the lowest possible cost. Many patients are being transferred from nursing homes to less costly facilities that basically offer only custodial care. The goal is to move as many patients as possible out of facilities providing inappropriately intensive medical support to institutions offering just maintenance, meeting state-approved standards of quality, but without the medical services now deemed unnecessary.

An arbitrary grading system has been established to evaluate nursing home patients to determine their suitability for transfer Patients are assigned a certain number of points according to their ability to dress, feed, clothe themselves, and the like. If the number of points the patient receives is higher than a designated total, officials feel that the patient can be transferred without any harmful effects.

When she is evaluated, Mrs. B. receives more than the designated number of points, and the decision is made to transfer her. She is not consulted, nor is she given a voice in the decision. She is simply moved—forcibly and against her wishes to a custodial care institution. The evaluation does not take into account the psychosocial impact of the move or the personal dimensions of Mrs. B.'s adjustment to the home she had been in for the last decade.

Is the state's conduct ethical? Since it is paying the costs of care, and since it has assigned a higher priority to other areas of medical care for funding, does it have the right to disregard individual patients' wishes concerning the location of their care?

Printed with permission of the Institute of Society, Ethics, and the Life Sciences: Lawrence Hessman, Charles Fried, Robert Michels, and Steven Severts, "Forced Transfer to Custodial Care". *Hastings Center Report*, June 1979, pp. 19–20, 26.

CASE STUDY #7—SUGGESTED QUESTIONS

1. What is the age and condition of Mrs. B.?
2. Why does the state consider moving her to a different facility?
3. What factors does the state's arbitrary grading system include as well as exclude?
4. Is it the right of institutions to make decisions that affect the lives of individuals and may influence them adversely?
5. Since the state is paying the costs of care, does it have the right to disregard individual patients' wishes on the location of their care?
6. What guidelines should the state have followed in making decisions regarding custodial care transfers?
7. Suppose you were a person in need of intensive medical support. What would your feelings be if the state took into consideration Mrs. B's wishes but, as a result, had to exclude you?
8. Should dependent citizens have any rights and privileges?
9. If you were an administrator and observed laws or rules that tended to promote unethical behavior, what action should you take?

CASE STUDY #8—WHO SHOULD PAY FOR THE EXTRA CARE?

Otis Simmons, a fifty-eight-year-old derelict, walked barefoot in bitter cold through the streets of Manhattan shortly before Christmas, in order to reach Roosevelt Hospital. "I froze," he said later. "I sat in one place 15 hours." After he was hospitalized, he developed gangrene in his badly frostbitten feet. The doctors wanted to amputate the infected portions, noting that otherwise the condition could become "life-threatening." Simmons refused the treatment. "My two legs got to stay on. I won't have the operation. I got to cure my own self."

Soon after, despite objections from hospital physicians a State Supreme Court justice ruled that Simmons was legally competent and had the right to refuse the amputation.

Antibiotic treatment helped to stall the infection. However, Simmons finally lost two toes on his left foot and part of his right foot. The bill for his three-month hospitalization amounted to $29,000 and has been submitted to Medicaid. A hospital spokesman has said, "We don't know how much they will pay or when they will pay it."

Assuming a competent patient has the right to refuse medical treatment, does he have the right to have Medicaid funds pay for additional care required by the refusal?

Reprinted with permission of the Institute of Society, Ethics and the Life Sciences: Willard Gaylin and Charles Fried, "Refusing an Amputation: Who Should Pay for the Extra Care?" *Hastings Center Report*, February 1980, pp. 23–24.

CASE STUDY #8—SUGGESTED QUESTIONS

1. What is the physical condition and background of Otis Simmons?
2. What predicament is the state and hospital put into because of Otis' decision.
3. Why does Otis Simmons refuse the amputation?
4. Did the hospital act properly in incurring these expenses?
5. Do you admire the attitude that Otis Simmons exhibits?
6. Once Simmons refused the amputation should he have been discharged and denied further care?
7. Suppose one carried on a health defeating habit such as smoking or drinking. Should this person be given an unequal share of hospitalization that because of scarcity might deprive another person?
8. Assuming a competent patient has the right to refuse medical treatment, does he have the right to have medical funds pay for additional care required by the refusal?
9. Should an individual have the right to take his own risks and suffer his own consequences regardless of the cost to society?
10. Using the statement, "When it comes to decision-making, I am my own master. The consequences of my behavior had best be handled by others," should an autonomous person leave the consequences of his behavior to others?

SECTION V: SCIENCE, SOCIETY, MEDIA

Introduction

The popular imagery that is conjured up when the population thinks of science and the scientist is quite fixed. Science is described as the pursuit of pure knowledge based on observed facts and tested truths.

While the scientist is romantically visualized as a castle-building daydreamer who scurries about without hindrance, restrictions or economic pressure advancing the cause of science, in reality, these tenets held by society are only partially valid and when one delves more deeply he realizes that the pursuit of science is not in the ivory-tower some imagine.

The Federal Government decides to fund a certain kind of research, society screams for science to cure a pollution problem and *New York Times* arrogantly announces every day that it contains "All the News that's Fit to Print." We quickly realize that the pursuit of science is not given the Pollyanna flexibility imagined and is restrained by the confines and demands of government, society and the media.

In this section, the teacher will find six topics that examine external forces having an effect on science. The topics are:

I. What Forces Determine the Areas of Research a Scientist Pursues?
II. What are the Economic, Political And Moral Implications of Scientific and Technological Development?
III. What Are the Responsibilities that Scientists Have to Society in Regard to the Consequences of their Research?
IV. How does Governmental Policy Legislatively and Administratively Affect Scientific Development?
V. How does the Media Affect Society's View of Science?
VI. In What Ways does Society Determine Public Policy with Respect to Scientific And Technological Research?

In addition, each topic has been made into a complete lesson plan containing suggested objectives, development, desired content outcomes and summary questions that can be used for class discussions or homework. Through the utilization of these lessons the teacher should have a sufficient variety of ideas to teach the concepts of how science is influenced by government, society, and the media.

TOPIC I: WHAT FORCES DETERMINE THE AREAS OF RESEARCH A SCIENTIST PURSUES?

Objectives:

A. *Government Funding*

1. To explain that certain current popular scientific research areas have a greater chance of funding success.
2. To demonstrate that political changes cause basic differences in funded research areas.
3. To determine why scientists seek affiliations with certain colleges or institutions.
4. To indicate that there are non-scientific forces that control government funding.

B. *Industrial and Private Funding*

1. To recognize that forces exist from the sponsor that might conflict with the scientist's responsibility to disseminate his findings.
2. To relate techniques that might distort scientific data.
3. To analyze how companies or private foundations steer research to their own benefit.

C. *Political and Economic Influences*

1. To identify and explain that political and economic realities often pre-empt normal funding procedures.
2. To cite factors of political and economic reality that influenced scientific research.

D. *Public Concerns*

1. To demonstrate that areas of public concern influence and stimulate research and funding.
2. To illustrate that publicly perceived factors that undermine our quality of life receive immediate research attention and funding.

E. *Moral Forces*

1. To discuss the moral forces that influence the path of scientific research.

Development:

1. Elicit the different forces that determine the areas of research a scientist pursues.

   Examples

   a. Government Funding

   b. Industrial and Private Funding

   c. Political and Economic Influences

   d. Public Concerns

   e. Moral Forces

2. Using the techniques of discussion, research, oral reports, and position papers, the students will understand how the elicited forces affect areas of research a scientist pursues.

3. *Desired Content Outcome*

   A. *Effects of Government Funding*

      1. Current popular issues such as hazardous wastes, pesticides and nuclear energy are more likely to be funded.

      2. Changes in budget priorities brought about by political change, i.e., from funding of social programs to funding defense related projects.

      3. Realization that a scientist would seek affiliation with an institution that provides intellectual and financial support.

      4. An appreciation of the forces of money, influence and pressure brought by special interest groups that influence the direction of government funding,

         a. Environmental and conservation groups

         b. Tobacco industry and religious groups

   B. *Effects of Industrial and Private Funding*

      1. Profit is the immediate goal of industrial research; inconsequential and detrimental research might be avoided or suppressed by the scientist and/or the company.

      2. Techniques such as choosing appropriate scientific data or defending a position with chosen data distort the full effect of scientific research.

         Tobacco industry uses its own scientists to counter research findings that are against tobacco usage.

   C. *Political and Economic Influences*

      1. Realization that political philosophy and economic realities of the day determine the direction of scientific funding.

         a. The reaction to Sputnik

         b. The reaction to Three Mile Island

c. The perceived necessity of national defense

d. The energy crisis

2. The cost factors involved in research technology.

   Electron microscopes, computers, and instrumentation are all very expensive.

D. *Public Concerns*

1. Demands from the public sector have influenced the direction of governmental and private scientific research and funding.
2. Demands from the public sector are based upon concern for the quality of life that seems threatened.
   a. Hazardous wastes
   b. Low level radiation
   c. Carcinogens
   d. Threats to our food and water supply

E. *Moral Forces*

1. Moral forces determine the areas that a scientist researches.
   a. The question of abortion—the scientist decides when life begins
   b. Life sustaining instrumentation—the scientist deals with the question of brain death.
2. Moral forces determine the method of scientific research.
   a. Human experimentation within appropriate guidelines.
   b. Animal experimentation within appropriate guidelines.

SUMMARY—Possible Summary Questions:

1. What force do you think has the greatest effect on the direction of scientific research?
2. If these are the forces that affect scientific research, how do we account for the concept of "knowledge for knowledge" sake?"
3. Which of these forces should be the most important on the future direction of science research?
4. How do these forces affect our daily lives?

TOPIC II: WHAT ARE THE ECONOMIC, POLITICAL AND MORAL IMPLICATIONS OF SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT?

Objectives:

1. To discuss the positive and negative economic implications of scientific and technological development.
2. To identify the positive and negative political implications of scientific and technological development.
3. To analyze the moral applications of scientific and technological development.

Development:

1. Discuss with students the statement, "All major scientific and technological developments have had a far ranging impact on society."
2. Suggest to students a hypothetical development, for example, a new immortality drug, a newly discovered cheap source of energy.
3. With students list the wide range implications of this development.
4. Divide the list into economic, political and moral sections.
5. Using contemporary examples ask students to identify the political, moral and economic impact.
6. Ask students to evaluate each impact as either negative or positive.
7. Desired Outcomes
   A. Political Implications—*Positive*
      1. Increase in national security systems
      2. Greater political stability
         a. less unemployment
         b. higher standard of living
         c. advances in agricultural and industrial technology
      3. Greater world political stability
         a. Increases the prospects of world peace as agricultural and technological advances are spread to underdeveloped areas.

B. Political Implications—*Negative*

1. Potential destructiveness of the world wide arms and nuclear weapons race.
2. Political and social instability in under-developed areas as a result of rising expectations and technological advances that are counter to native culture.

C. Economic Implications—*Positive*

1. Increase in quality and quantity of consumer goods
2. Increased productivity
3. Increased accessability of technology to the general public
4. Improved health systems
5. Less long term unemployment through the creation of new industries

D. Economic Implications—*Negative*

1. Unemployment—job displacement in some industries
2. Dependence on the highly skilled technician
3. High cost of the elderly (Social Security)

E. Moral Implications

1. Society must sometimes decide between a better environment and economic factors
2. Moral and ethical problems as a result of advances in birth control, life support systems, genetics
3. The problems of improving the quality of life for an increasing number of people who live longer
4. The long range problems of creating a materially oriented society

SUMMARY—Possible Summary Questions:

1. Should scientists be concerned with the political, economic and moral consequences of their developments?
2. Should the political and economic implications of scientific and technological development outweigh the moral implications?
3. In your opinion which was the most important scientific or technological advance of the 20th Century?
4. Who should decide when a development is counter productive to the overall interests of society?
5. Discuss the statement, "Since the first technological advance, the development of neolithic agriculture, society has always raised objections to change."

TOPIC III: WHAT ARE THE RESPONSIBILITIES THAT SCIENTISTS HAVE TO SOCIETY IN REGARD TO THE CONSEQUENCES OF THEIR RESEARCH?

Objectives:

1. To analyze how society's view and the scientist's view of these widespread expectations for scientific responsibility may differ.
2. General Expectations
   a. to demonstrate the perceived importance of the kind of work a scientist chooses to perform
   b. to identify the different expectations of how scientific researchers should report their work
   c. to review and judge the general expectation that a scientist has complete resistance to outside forces in the research and publication of his work
   d. to evaluate the expectation that the scientific research produced will be understood by all individuals
   e. to discuss the expectation that the scientist will advise or warn of potential dangers and problems relative to scientific research
   f. to assess the popular expectation that scientific research should improve society's standard of living.

Development:

1. Using developmental questions, discussion and personal interpretation, construct the perceived responsibilities that scientists have to society in regard to the consequences of their research.

   Examples

   a. the kind of research a scientist performs
   b. the criteria and methods used by the scientist to report his work
   c. the expectations that exist regarding resistance to outside forces
   d. the level and quality of communication a scientist uses in explaining his research
   e. the expectation that the scientist will advise or warn society of potential dangers or problems

f. the feeling that the role of scientific research is exclusively concerned with the improvement of our standard of living.

2. Develop each of the general expectations and allow students to analyze how these expectations differ between society's view and the view of the scientist. Methodology may involve a debate or separating the class into two groups in which one takes society's view and the other takes the scientist's view. At the conclusion the class should clearly understand the philosophy of each group and appreciate why they are sometimes misunderstood.

3. Desired Content Outcomes

A. Expectation #1—The kind of research a scientist performs.

1. *Society's View*

a: The work performed should:

1. Benefit mankind.
2. Be practical in a tangible way.
3. Used for defense—nationalism—if necessary.

2. *Scientist's View*

a. The work he performs will hopefully be within his interest area.

b. The work will need financial support.

c. The work will not be done exclusively for mankind.

d. The work chosen might simply satisfy intellectual curiosity.

e. The realization that the result of his work may be used in a way other than intended.

B. Expectation #2—The reporting of scientific information.

1. *Society's View*

a. The scientist will report his work without compromise.

b. Taken for granted in the reporting will be the following:

1. Objectivity
2. Unslanted material
3. Accurate oral analyzing of data
4. Rigidly tested
5. Published fearlessly
6. Admits error when and if the evidence conflicts with the findings

2. *Scientist's View*

a. The work will hopefully be without compromise.

b. The scientist has the following realistic realizations:

1. Human error
2. Need for financial support
3. All answers do not exist

4. Human ego exists—the wish for fame and success
5. Time constraints
6. Personal bias in reporting

C. Expectation #3—Resistance of the scientist to outside forces.
   1. *Society's View*
      a. Resistance to outside pressure will be without compromise.
   2. *Scientist's View*
      a. The scientific work will hopefully be above all outside resistance.
      b. The scientist realizes that the following outside forces could affect him:
         1. Funding
         2. Governmental pressures
         3. Society's pressure
         4. Bias
         5. Economic conditions
         6. Industrial pressure

D. Expectation #4—The scientist will report his work in an understandable manner.
   1. *Society's View*
      a. The scientist should:
         1. Explain imaginatively.
         2. Show a degree of sympathy and understanding for the community's lack of scientific background.
      b. The society realizes that a scientific hubris exists but still expects clarity in reporting.
   2. *Scientist's View*
      a. A wish to communicate simply and accurately.
      b. A desire not to oversimplify to the point of misunderstanding.
      c. A wish or need to retain scientific hubris for the independence of the profession.
      d. Society has a responsibility to put forth the effort to understand the data presented by the scientist.

E. Expectation #5—To advise or warn the public of potential dangers and problems.
   1. *Society's View*
      a. The scientist should report potential dangers and problems without compromise.
      b. Society is making demands on the scientific community for concrete definite answers to current problems.

2. *Scientist's View*
    a. There is a genuine desire to protect and warn the public.
    b. There is a realization that pressures exist from:
        1. Financial supporters, grantors and industry.
        2. University employers—"Publish or Perish" philosophy causes premature publication.
    c. Public apathy exists in our society as exemplified by:
        1. Not caring about scientific research in general.
        2. Discarding much of what is published as being useless.
        3. Society's view that anything that does not directly apply to the individual is useless.

F. Expectation #6—Scientific research will improve the standard of living for society.
    1. *Society's View*
        a. Science is above all other pressures and exists for the pursuit of a better life.
    2. *Scientist's View*
        a. Hopefully, a better standard of living will result as an offshoot of independent research, e.g. NASA program, calculators, computers.
        b. Realizations that funding pressures will dictate the direction of use.
        c. Much of the research performed is for the sake of intellectual curiosity that exists in a scientist rather than his need to be humanitarian.

SUMMARY—Possible Summary Questions:

1. Which of these general expectations or responsibilities do you think is most important to the scientist? Society? Why?
2. How does society's view of the scientist and the scientist's view of himself differ?
3. Why are scientists and society often at odds since both have "noble" desires?
4. What would result if the checks and balance relationship between society and science did not exist? Why?
5. How can society and the scientist move closer together in the future?

TOPIC IV: HOW DOES GOVERNMENTAL POLICY LEGISLATIVELY AND ADMINISTRATIVELY AFFECT SCIENTIFIC DEVELOPMENT?

Objectives:

1. To identify the reasons that promote the government to legislatively and administratively affect scientific research.
2. To analyze why and how each of the pressures on government stimulate legislative and administrative action.
3. To specifically list examples of legislative and administrative governmental policy.
4. To deduce why the government acted to promulgate the specific laws, acts and organizations listed.
5. To discuss the problems encountered as a result of governmental involvement in scientific research.
6. To arrive at the benefits that society attains as a result of governmental involvement in scientific research.
7. To enable students to debate the question of governmental influence on scientific research and derive an intellectual platform of opinion they can disseminate.

Development:

1. Explore the different reasons that government legislatively and administratively involves itself with scientific research.

   EXAMPLES: The effect and role of
   - A) Special interest groups
   - B) General public outcry
   - C) The media stimulating an issue
   - D) The scientific community
   - E) Traditional values of society
   - F) Sociological pressures

2. Formulate through student reporting, development learning and position papers how each of the above forces cause governmental movement.
3. Derive a list of specific examples of legislative and administrative governmental acts or commissions that affected the direction of scientific development.

4. Enable the students to construct a table explaining the problems and benefits associated with legislative and administrative governmental action.
5. At the conclusion of this material, the student should have enough of an in-depth understanding in governmental action that he can clearly write a position paper as to the morality of the government becoming involved in scientific research.
6. Desired Content Outcomes:
   A. What are the reasons that government legislatively and administratively affects scientific research?
      1. Effect and role of special interest groups
         a. Environmentalists—clean air and green belts
         b. Labor unions—asbestos and coal workers
         c. Religious groups—moral issue—abortion
         d. Health groups—cigarette smoking
      2. General public outcry
         a. Fear of pesticides
         b. Fear of the results associated with recombinant DNA research
         c. National defense—increase in military spending
      3. Media stimulating an issue
         a. Exposure of the water supply to hazardous wastes
         b. The real threat of nuclear reactors that are not constantly screened—Three Mile Island
         c. Books published like *Silent Spring* by Rachel Carson exposing the dangers of pesticides and our food supply.
      4. Scientific Community
         a. Warnings of chemical pollution, birth defects and carcinogens are but a few in which scientists themselves alerted the population to control.
      5. Traditional values of society
         a. The type of laboratory subjects that will be used for experimentation—animal or human.
         b. The moral parameters that will be used in the testing procedures. EXAMPLE: Undue cruelty, unnecessary surgical procedures.
      6. Sociological Pressures
         a. The administrative changes in I.Q. testing which was found to be unfair to individuals who have been educationally and sociologically deprived.
   B. What are examples of legislative and administrative governmental policy affecting scientific research?
      1. Clean Air Act
      2. Emission Control Standards

3. Standards and procedures set by the E.P.A. (Environmental Protection Agency, N.I.H. (National Institute of Health) and Human Resources Administration
4. Funding for programs stopped by the Reagan Administration

a. Abortion Clinics

5. NASA—National Aeronautics and Space Administration—This agency which had such high governmental priority during the 1970's now has received drastic cutbacks in its budget.
6. Atomic Energy Commission—Responsible for the building and maintaining atomic plants.
7. OSHA-Occupational Safety and Health Administration—This agency is responsible for safety standards and materials.

C. What are the problems and benefits of governmental involvement in scientific research?

1. Problems of governmental involvement
   a. Too much regulation will stifle the creativity of the scientist and direct the areas of research he performs.
   b. Excessive regulation leads to too much control of scientific research.
   c. There is a steering of research into questionable moral areas when governmental support exists.
      EXAMPLE: (1) Mind Control
      (2) Recombinant D.N.A.
   d. A question arises as to the cost effectiveness of governmental regulations.
2. Benefits of governmental involvement
   a. There is a yield of other benefits to society that flows because of funding intensity and longevity.
      1. The NASA program has yielded superior transistors, micro-computers and high resolution television to name a few.
   b. The quality of our environment has improved.
      1. Lake Erie pollution.
      2. London particulates in the atmosphere.
      3. OSHA regulations.
   c. The quality of our working place has improved.
      1. Coal mines—decrease in black lung disease.
      2. Asbestos workers wear masks and have proper ventilation.
   d. The quality of our health and safety has improved.
      1. Flammable resistant pajamas for children.
      2. School innoculations.

Summary:

1. What are the forces exerting influence in society that cause governmental controls affecting scientific development and research?
2. What are the problems and benefits that are encountered as a result of governmental involvement in scientific research?
3. How do political influences affect governmental programs and what do you predict will occur in the next five years?
4. How has society benefited or been hurt by the great amount of governmental control of scientific research?
5. Project yourself to the year 2050 A.D. What effects do you think government will have on scientific research?

TOPIC V: HOW DO THE MEDIA AFFECT SOCIETY'S VIEW OF SCIENCE?

Objectives:

1. To list the various forms of media communication.
2. To identify those forms of media communication used most by the public to gain scientific and technological information.
3. To analyze how these forms of media communication affect the public's knowledge of science and technology.
4. To discuss how the media affect the public's opinion of science and technology.
5. To evaluate the mass media as a communicator of scientific and technological information.

Development:

1. Elicit the various forms of communication.
2. Ask students to select from the list those forms of communication most widely used by the general public to gain scientific and technological information.
3. Classroom procedures involving examples of newspaper articles, television specials, and developmental questions could be used to direct student understanding of how the mass media affects the general public's opinion and knowledge of scientific and technological advances.
4. Discuss with students the quality of information and misinformation the mass media communicates to the general public.
5. Desired content outcomes:
   A. Forms of media communication most likely used by the general public.
      1. Newspapers, daily and "supermarket variety"
      2. Television
      3. Movies
      4. Magazines
   B. Effects of the mass media on the public's level of scientific and technological knowledge.
      1. Increased knowledge of environmental dangers.
      2. Increased knowledge of advances in medical science.

3. Increased knowledge of space research.
4. The increase in knowledge is a result of the sometimes extensive coverage of news events that deal with these advances.
5. Movies based upon science fiction often give an inaccurate view of present day scientific and technological achievement.
6. Drug commercials sometimes inaccurately describe human anatomy.

C. How do the mass media affect public opinion?
1. The selection of articles—what shall be communicated—sets the standard of what is important.
2. The views of certain scientists (personalities) are given more coverage than other scientists.
3. The views of scientists with a high recognition factor therefore become more newsworthy and their views on subjects beyond their expertise become more credible.

D. How well does the mass media communicate scientific and technological information?
1. The reporter is not always a person with an extensive scientific background.
2. As a business, the media is subjected to pressures of advertisers and readers.
3. The media has to deal with the economic realities of space in publications and time on television.
4. As a business, the media sometimes uses sensationalism to sell its product.
5. Programs such as "Nova", "Cosmos", and coverage of space flights and environmental dangers do an excellent job of communicating scientific knowledge.

SUMMARY—Possible Summary Questions?

1. React to the statement, "*How* we know is as important as *what* we know?"
2. How should a scientist deal with the wall of scientific hubris that stands between the scientific community and the general public?
3. What responsibility does the public have in regard to learning more about advances in science?
4. Does the mass media have the responsibility to communicate every scientific and technological discovery?
5. Are there better ways of communicating scientific and technological advances?
6. What are the dangers when society receives its information through a limited number of sources?

TOPIC VI: IN WHAT WAYS DOES SOCIETY DETERMINE PUBLIC POLICY WITH RESPECT TO SCIENTIFIC AND TECHNOLOGICAL RESEARCH?

Objectives:

1. To illustrate the methods in which society influences public policy.
2. To explore specifically the operation of special interest groups so as to understand their complexity and power.
3. To discuss how special interest groups use money, influence and pressure to affect public policy.
4. To identify various special interest groups that are involved in influencing public policy.
5. To investigate specifically the operation of the media so as to understand their complexity and power.
6. To indicate the procedures that individuals may use to influence public policy.
7. To evaluate the effectiveness of special interest groups, the media and the individual in influencing public policy.

Development:

1. State the forces that influence public policy.
   EXAMPLES: a) Special Interest Groups
   b) The Media
   c) The Individual
2. Develop the methodology of special interest groups, the media and the individual used to influence public policy.
3. Analyze the effectiveness of special interest groups, the media and the individual in influencing public policy.
4. Classroom procedures involving newspaper articles, developmental questioning, interviews with legislators and socially involved scientists, and mock hearings on public issues could enhance the presentation of this information.
5. Desired Content Outcomes

   A. Methods of input used by the forces that influence public policy:

      1. Role of Special Interest Groups:

Operation

a. Explain the view of their organization to legislators.

b. Make contributions to political campaigns. (PAC—Political Action Committee).

c. Make personal contacts with people in authority.

d. Use of the media to inform the public of the group's view.

e. Use their membership as a pressure force on legislators (Votes).

f. Organize "grass-roots" meetings to foster their cause.

g. Organize letter writing and telephone campaigns to foster their interest.

h. Invite certain individuals of celebrity status to bring their name, views and reputation to enhance the cause of the lobby.

i. In summary, each of these operations use money, influence and pressure.

Examples of Special Interest Groups:

a. Scientific community—
i.e. Scientist's Institute for Public Information, Atomic Scientists and Federation of American Scientists.

b. Environmental groups—
i.e. Sierra Club, Environmental Defense Fund and National Audibon Society

c. Industrial Groups—
i.e. Pharmaceutical Manufacturers Association, Tobacco Growers Information Committee and the Manufacturing Chemists' Association

2. Role of the Media:
Operation

a. Investigative reporting

b. Magazine formats

c. Documentary programs

d. Coverage of news items

e. Editorials

Effect of media's operation on public policy

a. Popular response

b. Growth of a special interest group

c. Legislative pressures

d. Directs responsibility

e. Generates controversy

B. Effectiveness of special interest groups, the media and the individual is determined by:

1. The amount of pressure it can exert.

2. The political climate that exists at that time (Carter Administration vs. Reagan Administration).
3. The success of its various operations.
   EXAMPLE: Delivering votes.
4. Kind of legislation, written as a result of its influence.
   EXAMPLES: a) Clean Air Act as a response to air pollution.
   b) Environmental Policy Act as a response to environmental pollution.
5. The economic climate of the times.
   EXAMPLE: The willingness of the public to pay the increase in consumer prices as a result of environmental legislation.
6. The moral climate for receptiveness.
   EXAMPLE: Abortion—Changes of view on abortion funded projects.
7. The generation of controversy.
   EXAMPLE: Letter and telephone responses to a media presentation.

SUMMARY—Possible Summary Questions:

1. What force exerts the greatest effect on public policy?
2. If you wanted to affect public policy what approach would you use?
3. Do these forces on public policy create a *better* public policy?
4. In view of the technological advances in the world, how do you think public policy will be influenced in the future?